# Defining the Informatic Person — Exploring How Socio-technical Relationships are Created and Negotiated in Informatic Contexts

Submitted by

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# Abstract

Societies have become informatic in nature, with "patterns of living that emerge from and depend upon access to large data banks and instantaneous transmission of messages" (Hayles 1999:313). This thesis explores the social relationships and practices that emerge around informatic trends. To capture recent developments a novel conceptualisation, that of Informatic Context and Informatic Persons, is proposed. The Informatic Context is the context of data and data technologies in contemporary society, and is defined by the presence of Data Interfaces (that connect individuals to digital contexts), Data Circulation (trends in the movement and storage of data), and Data Abstraction (data manipulation practices). Informatic Persons are those who reside within this context. Using these concepts, this thesis asks what does it mean to be an Informatic Person, and live in an Informatic Context? It explores the kinds of relationships (between humans, nonhumans, or combinations of) assembled while living in the Informatic Context, and how Informatic Persons negotiate and manages these. A qualitative methodology is adopted to achieve this. A sample of twenty two, affluent technology users participated in in-depth, semi-structured interviews to collect data. Results were conceptualised using Irwin and Michael's (2003) theory of Ethno-Epistemic Assemblages.

The adoption of informatic technologies, learning skills and technology, risks and surveillance, the benefits of living with Informatic Technologies, and tensions with nonhuman actors are identified as salient relationships that Informatic Persons negotiate. The original contribution of this research is in the identification of how these relationships are highly scalable, and negotiated through narratives of control. Digital mediations have the potential to change the scale of relationships, connecting any interactions to broader socio-technical contexts. These relationships are managed through a narrative of control, with Informatic Persons emphasising their heightened capacity for controlling life through the Informatic Context, despite the limitations of individual agency and technology.

# Declaration of Originality

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material that infringes copyright.

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Ashlin James Lee

25th July 2016

# Publications Arising from the Thesis

Materials relating to some chapters of this thesis have been published as journal articles, as listed below, in accordance with the University of Tasmania's Guidelines for Incorporating Publication into a Thesis and Authorship of Research Policy.

Lee, A. (2015) 'Integrating Subjects: Linking Surveillance Experiences to Social Patterns Using Ethno-Epistemic Assemblages', *Surveillance & Society* 13(3/4): 385-99.

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# Statement of Ethical Conduct

The Tasmanian Social Sciences HREC Ethics Committee granted Full Committee Ethics Application Approval (H0012872) to this project. The research associated with this thesis abides by international and Australian requirements and was conducted at all times in accord with the National Statement on Ethical Conduct in Human Research.

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# Chapter 1 — Introduction

This thesis explores the question of what it means to live in a society filled with data, and data technologies. Data and data technologies have become a central part of contemporary society. From the internet (and associated internet services like social media) to mobile technologies (such as smartphones, tablets and other wireless devices), digital systems are entwined in many aspects of society. Yet in becoming so central, they also reveal a sociological terrain that is messy and contested. Consider the following examples:

- Celebgate/The Fappening — Approximately 500 photographs from a range of celebrities, including Kim Kardashian, Scarlett Johansson and Jennifer Lawrence, were illegally accessed from the "iCloud" online cloud storage platform provided by Apple Computers (Cameron, 2014a; 2014b; Naughton, 2014). Starting on 31 August 2014, hackers began leaking the personal and intimate content that celebrities had stored on the cloud to popular image sites such as 4Chan, Reddit and imgur (Fallon, 2015). Much of this content was uploaded automatically to iCloud without the knowledge of users, from their smartphones (particularly Apple's iPhone), as a part of an automated back-up procedure common to Apple devices. These leaks were widely condemned by celebrities, information technology experts, security professionals and law enforcement. Although efforts have been made to investigate these leaks, and the vulnerabilities in question addressed, these intimate materials are still easily available online through a simple search.
- Ashley Madison Data Leak — in a similar incident in July 2015, hackers calling themselves "The Impact Team" stole the personal information of users of Ashley Madison, a dating site aimed at facilitating extramarital affairs (Goodin, 2015). Although encrypted, the simple passwords adopted by users allowed these encryptions and security measures to be negated. Names, addresses and bank account details of users were released, in addition to

> information pertaining to their conduct on the site (Hern and Gibbs, 2015). The release of their data prompted significant legal and ethical debate as while nothing illegal had occurred, the site had aided in a morally tenuous act. Many users were humiliated and blackmailed (Hearn, 2014). While prompting real-world discussion, analysis of the data revealed that of the 5.5 million accounts leaked many did not belong to human users. Instead many users, especially those appearing to be female users, were actually bots[1] (Newitz, 2015). Furthermore, less than 1% of female users exhibited regular activity, and most of this activity was again believed to be from bots.

Illustrated above are the numerous issues people face when living in societies where data technologies are prevalent. They reveal how digital systems from social media services like Facebook, to mobile devices like iPhones and other smart devices, exist as complex socio-technical sites. These devices and systems are not perfect, frictionless or without conflict. Instead they are impure, messy and ambivalent (Haraway, 1985; Latour, 2005) as they are mechanical, technical and social. Technologies (digital or otherwise) cannot be removed from their social context (Bijker, 2010), they are "society made durable" (Latour, 1991: 103), and are implicated in important sociological issues.

These technologies and digital services present new kinds of risk with which contemporary persons must contend. Both of the examples above reveal that the information collected and submitted to digital services is highly identifiable, with little opportunity for anonymity. Whether this is through choice (such as celebrities uploading intimate photographs) or by accident (in the case of Ashley Madison), highly detailed personal information is available online. Thus there is a question about how much control individuals and organisations have over their data. The complexity of these systems furthers potential risks (in the case of Celebgate) as the automations and procedures of

[1] "Bots" are software programs and algorithms designed to impersonate or replicate human users in the digital space.

digital systems can sometimes constitute a risk. Even when users do take some due diligence (in the case of Ashley Madison), techniques such as encryption and passwords are not necessarily enough (or used appropriately) to protect a user. Breaches in control over data have significant consequences, and are not distant or unrelated acts, but of central importance to everyday life.

These breaches of trust raise questions about practices in the digital space and what kinds of conduct are, and are not, appropriate. The impacts of Celebgate and the Ashley Madison leaks are significant, with lawsuits involved in both (Basu, 2015; Sankin, 2014), and at least two suicides related to the Ashley Madison leaks (Malm, 2015). To this date, only one person has been formally arrested in either case. What is also striking about both these events is the response of the broader community. Numerous calls of shame and derision were made towards victims of Celebgate for taking intimate photos on their iPhones (Naughton, 2014), with the suggestion that there are "safer" and more prudent forms of online interaction possible (Dewey, 2014; Valenti, 2014). Thus a number of questions are raised concerning individuals' practices and expectations towards data. Normative assumptions and statements are made in relation to one's personal and social practices in the use of technology, and data generation and storage. This suggests emerging standards and expectations of behaviour, including the level to which digital technologies should be incorporated into social practices (particularly those relating to intimacy as Celebgate suggests), and what steps and behaviours are prudent to securing and managing digital information. For example, discussion on encryption and privacy for Ashley Madison users highlights an expectation for both individuals and corporations to exercise a certain level of control and discretion around data use. Just as these new technologies and services are messy and contested, so are the corporate and individual forms of conduct surrounding them.

At a more theoretical level, the above examples highlight the heterogeneity of relationships between human and nonhuman social actors. As Latour (1993; 2005) and others (Callon, 1980; Law and Callon, 1988; Pickering, 2010) have argued, nonhumans are an important aspect of society. The

above examples highlight that society is mediated by nonhumans. Everyday personal and intimate relationships are enacted through mobile technologies and the capture and storage of personally identifying information. The above examples clearly illustrate this, with nonhumans such as mobile devices in Celebgate, the bots in the Ashley Madison case, and the expectation to control one's digital traces, showing how society is filled with relationships with nonhuman agents. Different technologies and services provide different kinds of affordances (Gibson, 1986; Hutchby, 2001), materially limiting or encouraging different types of social action depending on the context. These affordances, and how nonhumans contribute to the creation of society, must be an important consideration in social analysis.

A further consequence of heterogeneous networks is their impact on the scale of relationships. Through the affordances of technology individual or contextual acts (like intimate photography) can have connections to much larger social spheres (such as the media, or into the realms of police and security services). Macro-social trends and concerns (such as data security or ethics of technology) are also made more relevant to individual users, reaching down into individual practices through devices like smartphones. Data and data technologies thus facilitate relationships that can easily transcend social contexts and boundaries, blurring the lines between private acts and public concerns. Therefore, not only are the actors within relationships varied, but so too is the scale of the relationship.

The above issues are not raised in any order of importance. They are also not given as a summation or totalising statement on the digital society, but to highlight that there are emerging, contested and potentially unclear relationships and issues arising within the digital space. Questions remain around the presence of data in society, and the kinds of relationships and contexts that everyday persons must negotiate as a part of this arrangement. This thesis explores these issues. It seeks to empirically and conceptually develop the context of data, and presents an investigation into the relationships and practices occurring within it, from the perspective of those living in contexts of data.

## Research Questions:

To investigate social relationships around data, this research adopts a novel conceptualisation of data and society. The socio-technical trends and developments relating to data and data technologies are conceptualised as part of an Informatic Context, with the person living in this context, and thus the situated knowledges and relationships they create, being conceptualised as examples of Informatic Persons. The state of being in the Informatic Context, and living as an Informatic Person, is called Informatic Personhood. These concepts frame the empirical investigation and do not represent a theory. Theoretical and empirical justification of these concepts are developed in Chapters Two and Three. These concepts are applied to a group of affluent users, who represent the best source of data on technology use. The limitations of this sampling approach and the potential implications for generalising the results are acknowledged, with detailed justifications and rationales for the methodology raised in Chapters Four and Ten.

Drawing on these concepts, this thesis is guided by the following research question:

- What does it mean to be an Informatic Person, and live in an Informatic Context filled with data and data technology?

Two sub-questions are also adopted here, these being:

- What kinds of relationships (between humans, nonhumans or combinations thereof) are assembled while living in the Informatic Context?
- How do Informatic Persons negotiate these relationships and manage their implications?

## Outline and Approach — Informatic Persons and the Informatic Context

Chapters Two and Three develop the concepts of the Informatic Contexts and Informatic Person. Chapter Two presents a literature review divided in to the three pillars of the Informatic Context model: Data Interfaces, Data Circulation and Data Abstraction. The details and justification of the conceptual framework are explained in Chapter Three.

Chapter Four develops a methodological approach that manages the heterogeneity of relationships present in the Informatic Context, adopting Irwin and Michael's (2003) Ethno-Epistemic Assemblage (EEA) approach. This model accepts and embraces the idea of heterogeneous relationships and nonhuman actors through the idea of assemblages, but also focuses on the situated nature of the assemblages and the contextual knowledges and beliefs present in them. This model allows a detailed examination of the Informatic Context and its human and nonhuman elements.

The remaining chapters present the findings of this research, each exploring a different relationship formed in the Informatic Contexts by participants. For example, all participants describe relationships around adopting specific items of digital technology into their life. Chapter Five explores the circumstances around this. It notes how the process of adoption reflects an obligation to use informatic technologies in everyday life, and how EEAs on adoption, both positive and negative, are informed by varying degrees of obligation. Adopting informatic technologies does not ensure their use: this must be learnt and integrated into everyday life. Chapter Six explores the learning processes and digital skills of Informatic Persons. Participants indicate that learning relationships are structured around ideas of immediacy (an obsession with speed and easiness) to the degree that they limit their learning to maintain this experience of speed, creating black boxes around their own use.

Chapter Seven turns to the risks of being an Informatic Person, particularly around surveillance. These risks are understood as contextual and negotiated, with participants understanding risks

through the idea of control. In managing these risks participants present highly nuanced EEAs. They value control, yet negotiate this against a sense of acquiescence to risk, using the trope of “Nothing to Fear, Nothing to Hide”. This is based on how much they value control, and competing forms of value.

The final two data chapters explore relationships formed through living and operating as Informatic Persons. In Chapter Eight, the capacity of the Informatic Context to advantage and support an Informatic Person is raised. The Informatic Context allows an increased ability to control one’s relationships and provide an advantage in everyday life. There are complications to this use however, as is raised by Chapter Nine. The Informatic Context places human users in close relationships with nonhuman systems, relationships that can produce tensions for human users. These tensions are explored in Chapter Nine, as are the acts of purification used to separate humans from nonhumans.

The final chapter brings together the individual relationships discussed in the data chapters to illustrate how relationships in the Informatic Context are defined by their scalability, and negotiated through the lens of control. The Informatic Context contributes to socio-technical conditions that allow relationships to shift contexts more easily. The implications of these relationships are managed through a persistent belief in a user’s ability to control the Informatic Context. Informatic Persons believe they achieve their own modulations of control over their lives through the Informatic Context. These changes herald significant shifts in the digital society. Scalability promises new and innovative digitally facilitated relationships and socialities, but also increased vulnerability to digital risks. The persistence of control may make sense to Informatic Persons, but it potentially furthers their vulnerability to these risks, providing a false sense of security. The limitations of this research, and future directions for addressing these issues and expanding this research, are also raised.

# Chapter 2 — Literature Review

## Introduction

The significance of data and data technologies in society is the culmination of numerous social and technological developments, and it is these developments that this chapter explores. Three key patterns are identified empirically and theoretically in this chapter: data interfaces, data circulation and data abstraction (or simply interfaces, circulation and abstraction). These categories are significant because they demonstrate how data and data technologies have become entwined in society and social relationships. They are the primary sites in which data and data technologies have come to impact on social relationships, and contribute to the current socio-technical environment. Through exploring these elements the importance of data and data technologies is established, and provides the background for answering questions concerning people's relationship to data, and what these relationships might mean. These concepts also form the basis for the conceptual framework of this thesis, as each is a critical point in the Informatic Context and in the rise of Informatic Persons (explored in more detail in Chapter Three).

The argument in this chapter occurs in stages, with each stage illustrating data's impact on people and society. Succinctly put, more contexts and relationships are linked to data (through interfaces), which means more data are in circulation between different social entities, and that these data can be manipulated and worked upon to enact society (abstraction)[2]. The first section on interfaces explores the rise of convergent, multimodal interface technologies, particularly through the evolution of mobile phones towards smartphones and other consumer electronic devices. The multimodal and increasingly digital nature of these devices means an increased ability for everyday

[2] Many examples here have significant crossover between the three pillars, and do not have a discrete or clear fit. For example, discussion on social media describes a new networked and circulation-based way of sociality (boyd, 2014), something that is enacted in everyday life through the use of mobile technologies (Goggin and Crawford, 2010), and is simultaneously linked to practices of data analysis and issues such as marketing (Carah, 2015) and surveillance (Trottier, 2012). Thus the use of categories here is not undertaken in a rigid manner: this kind of crossover is noted, accepted and also expected, given the nature of data in contemporary society.

life to be translated into data, with numerous digital representations (digital traces) of everyday life and the embodied user produced. Interfaces are found to be involved in an exceptionally large number of everyday social practices, and therefore place data and data technologies at the centre of many social relationships. This leads to a discussion of circulation, which emphasises the new kinds of socialities and social issues that come with the rise of data in society. These issues, such as digital divides and databases, are explored at length to emphasise the increased volume and importance of data and data technologies in society. Finally, elements of data abstraction are explored, with a particular focus on Big Data and algorithms. This section reveals the increasing number of abstractive techniques linked to data, and how these techniques are being incorporated and used in the enactment of society, and what the implication of data and data technologies can be. These categories provide the background for issues raised in Chapter One, developing the vectors of socio-technical change that have allowed changes in relationship composition, scope and management/control. Together they create an Informatic Context and, as people live within this context, create the conditions for Informatic Personhood (discussed in Chapter Three).

## Part 1 — Interfaces

### Mobile Phones as Interfaces

While recent technologies such as smart devices and smartphones, and personal computers, are the obvious examples of technologies that link social contexts to data, the success of these and other personal digital/electronic devices owes much to the mobile phone. The mobile phone is perhaps the most significant personal electronic device of the early 21st century, with Katz and Aakhus (2002: 4) stating “the last time a communication technology had such a large effect on so many people was nearly a half-century ago when commercial television was introduced”. Kalba (2008) suggests a critical mass of availability, pricing and infrastructure was reached in the developed west in 1997, suggesting this to be the year that “pocketphones [...] migrated from the car to the pocket

and purse" (Kalba, 2008: 16). Statistics from the International Telecommunications Union (ITU) support such an assertion, noting sharp rises in mobile telephone subscriptions from the mid-1990s onward in developed Europe and Asia-Pacific nations (International Telecommunications Union, 2015). With the achievement of this critical mass, diffusion of mobile technology was rapid, with mobile telephony and communication becoming impossible to ignore (Goggin, 2006: 4). Mobile phones afforded a significant new experience to communication, as Campbell (Campbell, 2008a: 153) describes, "the body now wears communication technology, and the technology is often like a second skin to its users", bringing the technology into the immediate social space of a user. The mobile phone represented a communication technology that was not limited by location, and was able to progress with a user through space and time (Larsen et al., 2006; Urry, 2007). The central place of data in society is built upon these pre-digital foundations of mobile phones. By providing telecommunication connectivity while in motion, mobile phones become embedded in social action. As technologies miniaturised and infrastructures developed further, mobile phones become digital and linked to digital platforms. Data can therefore be received, created and used as a part of social relationships and contexts, and not separate from it. The impacts of pre-digital mobile phones therefore foreshadow the potential of data and data technologies to society.

Mobile phones afford a new kind of social organisation and experience for users, allowing a constant line of communication. This has been described in various forms as "perpetual contact" (Katz and Aakhus, 2002), "connected presence" (Licoppe, 2004), "constant touch" (Agar, 2003) or "tethering" (Turkle, 2008b), where social relationships are created around combinations of absence, (co)presence, availability and telepresence (Giddens, 1995: 38; Green, 2002). Social relationships and activities are thus no longer limited by space, time or distance, but enacted across a hybrid space. This necessitates a reconfiguration of the norms around communication and contact in society, with the omnipresence of technology sometimes clashing with pre-existing norms (explored more in Chapter Nine). For example ICTs like the mobile phone are viewed as sources for spill-over

between work and home (Bittman et al., 2009; Wajcman et al., 2008; Wajcman et al., 2010; Williams et al., 2008), connecting individuals' private lives to their workplaces and employment duties (Gregg, 2011; Perrons, 2003; Towers et al., 2006; Townsend and Batchelor, 2005) and negatively impacting on personal lives (Currie and Eveline, 2011; Middleton, 2007; Parris et al., 2008). Employees must face a speeding up of their work life, with increasing demands upon their time and attention (Gregg, 2011; Wajcman, 2008) and fragmenting their work experience (Gambles et al., 2006; González and Mark, 2004; Rose, 2014; Vartiainen and Hyrkkänen, 2010). This spill-over is not however unilateral. As Wajcman, Bittman and Brown (2008) note, it reflects a permeability of social and institutional barriers as a whole, and it is often multidirectional. While work can encroach on personal lives and effect negative changes, increased permeability can also mean family life spilling over into work contexts, offering a flexible way of enacting and managing family life (Gregg, 2011; Hislop and Axtell, 2011; Wajcman and Rose, 2011). Therefore communication technology redefined the boundaries between different spheres of society, and how social relationships are facilitated through interface technologies.

This facilitation is also apparent in the changes to the quality and quantity of social networks, with mobiles linked to a diversification in the size and shape of networks. While some have been pessimistic about the impact of mobile technology, arguing that such technologies promote weaker, more geographically dispersed social ties (McPherson et al., 2009; Putnam, 2000), eroding positive social bonds (Banjo et al., 2008; Geser, 2004; 2006) and producing diversified social networks, others argue however that diversification is not problematic as it grows networks (Hampton et al., 2010; Onnela et al., 2007) and represents greater choices in relationships and interactions (Campbell and Park, 2008; Rainie and Wellman, 2012). Even in instances where the size of social networks decreases, the quality of social interaction remains high (Campbell and Kelley, 2006; Campbell and Park, 2008; Ling, 2004). In developing countries, mobile phones are linked to many community and socially cohesive activities, including developing entrepreneurial ventures (Aker and Mbiti, 2010;

Donner, 2006; 2008; 2010; Frempong, 2009), maintaining social relationships (Donner, 2007; Sey, 2011), improving close familial bonds (Madianou and Miller, 2011; Palackal et al., 2011) and improving community engagement (Sreekumar, 2011). Mobile phones are therefore implicated in changes to a user's social network, with mediated communications changing the composition and nature of networks without necessarily sacrificing quality or importance.

Mobile phones can also contribute to a user's identity, having personal and emotional significance. Mobile phones are intimate objects of an individual's personal sphere and hold great emotional significance (Kolsaker and Drakatos, 2009; Srivastava, 2005: 113; Vincent, 2006; Wehmeyer, 2007), a phenomenon described by Ling and Yttri (2002) as "hyper-coordination". Efforts to customise devices illustrate how mobile phones can be a source of emotional attachment and personal significance to users (Blom and Monk, 2003; Häkkilä and Chatfield, 2006; Hjorth, 2006), acting as a symbolic artefact used to perform identity. For example, the mobile phone can be a fashion accessory (Fortunati, 2005a; 2005b; 2005c; 2006; Katz and Sugiyama, 2006), impacting on the adoption, use and identity statements made. User demographics (such as age and gender) are an important factor in this discussion. Teenagers and young adults are found to often use mobile phones as a central point for social interactions and relationships (Ito, 2005; Stald, 2008; Thulin and Vilhelmson, 2007; Walsh and White, 2007; Walsh et al., 2008) and as a tool for conveying certain identities or social status (Foley et al., 2007; Tacchi et al., 2012).

Mobile phones represent an important development in interface technologies. By providing immediate, mediated telecommunications connectivity mobile phones have influenced the nature of many social relationships and contexts, and have come to occupy a significant space in social life. Although significant, the mobile phone is also a limited example of an interface. The socio-technical contributions a mobile phone makes are contingent upon the affordances of the device. This means that a majority of studies have conceptualised mobile phones as devices that send and receive short text messages (SMSs) and mobile audio calls (Arnold, 2003b: 243). The affordances of mobile phones

and associated infrastructure, however, have not remained fixed. Instead mobile phones have evolved into multimodal, mobile digital devices with an increased capacity for mediation and for digital translation.

**Digital, Multimodal and Smart Interfaces**

Contemporary interfaces such as smartphones and tablets are data-intensive devices. They are significant because the digital connectivity they provide affords new interactions and makes data central to mediating relationships and contexts. An excellent example of this is a device like Apple's iPhone, which Goggin (2009: 242) describes as "but one project among many that seek to modify the mobile to better take account of the things users expect from Internet and computing cultures, not to mention the genres, forms and practices of convergent media". This foregrounds the significant qualitative changes of the mobile phone, from a device solely about mobile communication via voice and text messages to a device that is multimodal (Schroeder, 2010), convergent (Jenkins, 2006; Jenkins et al., 2013; Lee, 2013) or polymedia (Madianou and Miller, 2013; Madianou, 2014). Rainie and Wellman (2012) identify four elements to the new socio-technical affordances that define contemporary interface technologies:

> [mobile phones] come together with four other developments to enable widespread mobile connectivity that have profoundly affected behaviour: (1) the emergence of lightweight portable computers: laptops, even smaller netbooks and tablets, and smartphones; (2) the rise of wireless connections so that people can connect to the internet wherever they can get a broadband phone or computer signal; (3) the emergence of cloud computing that enables people to store email, documents, and media, and to use social media on remote servers that are accessible from any connected device; and (4) the boom in app[lication]s that have turned smartphones into diversified personal

> and portable computing devices that can access the internet (Rainie and Wellman, 2012: 107).

This represents a critical change in the circumstances of mobile phone use (Rainie and Wellman, 2012: 107). It is thus incorrect to conceptualise contemporary interfaces in terms of being a "mobile" example of a "phone". Instead, they must be considered as the logjects that Dodge and Kitchin (2011) describe as devices inseparable in functionality and impact from data and digital traces. As Goggin and Hjorth (2014: 2) describe, these devices "encompass many forms of remediated and emergent practices — from camera phones and Smartphone apps like Instragam that romanticise the analogue, through creating temporal spatialities through geo-tagging, to the explosion of divergent forms of mobile gaming". These new multimodality capacities mean devices are reconceptualised in terms of mobile media[3] (Goggin and Hjorth, 2014; Hjorth, 2008b; Nilsson et al., 2001; Wilken, 2008), locative media (Farman, 2013; Pink and Hjorth, 2012; Tuters and Varnelis, 2006) or as sensors (Andrejevic and Burdon, 2015). The digital interactions they afford, such as multimedia, provide new kinds of mediated relationships (Castells et al., 2007; Goggin, 2006; Goggin and Hjorth, 2009; Hjorth et al., 2012; Ito et al., 2006). Highlighted here are not only the new features and mediated practices present (photography via Instragram, mobile gaming), but also how these practices are cemented in previous social and media contexts (for example photography and old media)[4]. Data-driven interfaces therefore build the existing relationships and contributions of mobile phones, creating and updating relationships through informatic mediation.

The affordances of multimodal devices such as cameras, enhanced networking capacity and geo-location services have allowed interfaces to progress beyond being devices of pure communication to being cultural artefacts that bring data into everyday life (Goggin, 2008; Gordon, 2002). Multimedia is an excellent example of this. Social practices around camera-equipped mobile and

[3] However, as Fortunati (2014), Manovich (2001) and Kim and Sawhney (2002) all note, the rapid pace of change around technology means that not every permutation is captured in these definitions.
[4] What Bolter and Grusin (1999) describe as remediation.

smartphones have had a relatively long history compared to other mobile media functions. First released in 2000 (Hill, 2013), Ito et al. (2006) note the rapid adoption of these devices in Japan[5], how new techno-social relationships formed around the camera, with an emphasis on everyday connectedness and extending co-present socialities through multimedia[6]. According to Pink and Hjorth (2012: 145) the capacity for mobile media to contribute and cultivate social relationships is succinctly expressed by Ito and Okabe and others (Ito and Okabe, 2005a; 2005b; Ito et al., 2006), who argue that cameraphones have increased *Saving*, *Storing* and *Sharing* capacities, the "Three S's".

Three S's are examples of functions that are data reliant, consistent with the logjects Dodge and Kitchin (2011) describe, and suggest the closer integration of data through interface technologies. The ability to capture or *save* the world into digital traces provides new possibilities for mobile interactivity, providing a new way of connecting and maintaining important social relationships (Goggin, 2006; Haddon and Kim, 2007; Hjorth, 2007b; 2008a; Ito and Okabe, 2005a; Ito and Okabe, 2005b; Ito et al., 2006; Kindberg et al., 2004; Mäkelä et al., 2000), and presenting the self and creating one's identity (Federman, 2006; Gye, 2007; Lee, 2005; Mihailidis, 2014; Okabe, 2004). It also presents numerous functional opportunities for note-taking and creating visual reference (Ames and Naaman, 2007; Kindberg et al., 2005; Ling and Julsrud, 2004; Scifo, 2005). What is significant is how these multimedia-equipped interfaces can potentially create new practices of *storing* and remembering, drawing upon the digital traces created by interfaces to offer new ways of experiencing past events and spaces (Farman, 2013; Frith and Kalin, 2015; Garde-Hansen et al., 2009) such as personal archives (Good, 2013; Jenkins, 2006; Scifo, 2009; van Dijck, 2008). The final "S" (Pink and Hjorth, 2012), *sharing*, foreshadows that socio-technical situations emerge from

[5] This occurs despite Ito et al. (2006) noting the relatively limited quality of the camera and image.
[6] This is described by Koskinen (2007) as reflecting the "banality" of mobile media and, while it has the potential to enrich personal relationships and social interactions, Koskinen is critical of the political and social significance outside of this.

interface devices that cannot be understood in isolation. Their significance comes from the incorporation and relationship to other forms of media and social situations.

Interfaces facilitate socio-technical relationships that emphasise the sharing of data, and integrate these data acts into existing social practices. For example, Pink and Hjorth (2012) describe the rise of networked visuality (Hjorth and Gu, 2012; Watkins et al., 2012) as an example of this. Otherwise banal personal media (Koskinen, 2007) do not remain centred on the device, or locked into immediate and co-present networks, but instead are (re)mediated through these digital platforms (such as Flickr or YouTube). The enhanced computing power and consistent internet access of smartphones and similar devices allow social media and social networking services to be reliably accessed, just like on a desktop computer, and media to become networked data through social media systems like Facebook and Twitter (for a review of the role of social media generally see (Baym, 2015; boyd, 2014; Fuchs, 2014a; Trottier, 2012; van Dijck, 2013). Interfaces are not just a means of accessing social media however, but are leveraged by these platforms as a part of mobile social media. Goggin and Crawford (2010) highlight how mobile social media has become entwined into the use of modern interfaces, acting as a "portal" for young people's social relationships and interactions, and being " intricately bound with developments in thinking about friendship, connection and intimacy" (Goggin and Crawford, 2010: 229). Multimedia, social media and telecommunication functions (calls and text messages) are all entwined in the operation of everyday life (Baym, 2015; Goggin, 2006; Rainie and Wellman, 2012) and have resulted in unique collaborations between the interface and social media, particularly around the development of location-based mobile and social media (Farman, 2013; Lemos, 2010; Pink and Hjorth, 2012; Tuters and Varnelis, 2006; Wilken, 2008; 2012). This is witnessed in Facebook check-ins and Foursquare using the global positioning system of interfaces to add location-based data to a user's interactions. Existing forms of social and multimedia (photographs, videos and social media posts for example) can be imbued with locative information, creating new social patterns and experiences that are

reconnected with a sense of place and movement (Gordon and e Silva, 2011; Sutko and de Souza e Silva, 2011). Data therefore become central to the mediated relationships and situated activities of users (such as multimedia), as Hjorth and Pink (2014: 54) state: "[digital] traces [are] made as camera phones are used, as mobile media weaving through material/digital environments with their users (as wayfarers), thus become forms of visuality that are emplaced digitally, socially, and materially" (Hjorth and Pink, 2014: 54).

The shift towards emplaced visualities and mobile social media highlights another important aspect of contemporary interfaces, that of the application or app. Applications refer to the novel pieces of software that can be run from modern interface devices. While applications were once restricted to desktop computers, sharp rises in the computational power of interfaces provided the opportunity for them to run applications. The rise in apps however is not just about computer power, but also about having a software environment or platform that supports users and developers, and having an appropriate distribution system for any applications. As of 2015, Apple's App store, Google's Google Play platform and Microsoft's Windows 10 environment (which is run across both mobile and desktop environments) allow users of these platforms to download millions of unique software applications to their devices. The ranges of applications possible are enormous, from games (Keogh, 2014), to office and productivity apps (Herrick, 2009), to social media (Frith and Kalin, 2015), to strange programs everywhere in between (Brewis, 2015). With enormous potential, it is strange that there has been relatively little social or sociological inquiry into applications[7]. Discussion on locative media and mobile social media often transgresses into discussion on applications, as such media are dependent on applications to function on interfaces, but are not often given the same analytical focus as the media in question. Applications represent an emerging area of importance as they are socio-technical artefacts that rely on data collection and manipulation, while simultaneously being closely associated with individual users. They foreshadow the importance of understanding the role

[7] A notable exception is Lupton's (2013; 2014b; 2015b) work on health apps.

of data abstraction (in the section on abstraction below, and conceptually developed in Chapter Three) in the lives of users, and what impact software and data manipulation have on relationships.

**Emergent Interfaces: Wearables**

Part of the success of mobile phones and smartphones has come from their mobility, and the physical closeness and intimacy that their construction affords (Fortunati, 2002; Richardson, 2007). Wearables and sensors take this relationship to the next level, being worn directly upon the body or integrated into existing clothing items while having a substantial range of data functions. An example of this the quantified-self movement[8]. The quantified self refers to a range of socio-technical and cultural patterns that emphasise a user voluntarily monitoring and quantifying daily routines and activities into digital traces, and analysing these traces to inform their future conduct (Swan, 2013; Whitson, 2013). These activities all revolve around the defining, quantification and recording (or sensing) of the body and/or environment of the user. Choe et al. (2014) suggest that the intention of users often reflects a desire to improve oneself (lose weight or exercise harder for example) or to discover and experiment with their bodily experience (see how much of a city they can explore using a GPS location system for example). Quantified-self approaches often rely upon the affordances of the smartphone to enact these tracking regimes, allowing intimate personal patterns such as sleep (Swan, 2012), eating habits (Kunze et al., 2013), sexual experiences (Lupton, 2015b) and potentially life-threatening medical complaints (Grönvall and Verdezoto, 2013) to be recorded[9]. They are examples of what Andrejevic and Burdon (2015) describe as sensors, and

[8] Alternative terms that describe quantified-self activities include self tracking (Lupton, 2014a; Pantzar and Ruckenstein, 2015), lifelogging (O'Hara et al., 2008; Sellen and Whittaker, 2010) or personal analytics (Ruckenstein, 2014).

[9] In addition to the use of the smartphone as a tracking tool, there are a number of specifically designed devices and applications available. Standalone devices such as Jawbone and Fitbit provide a multipurpose tracking interface in combination with a smartphone. There are also exercise-specific devices such as Nike's FuelBand and Nike Fit+ app or UnderArmours Armour39, and even devices specially designed to monitor sexual acts and practices (Kamen, 2015).

represent a socio-technical trend for data to be created, collected and shared as a part of everyday social relationships (this is discussed in more detail later in Part Three of Chapter Two).

Additionally, smartphone manufactures such as Apple and Samsung have sought to deploy digital watches, which contain similar functionalities to a smartphone, in a wrist watch. Often these devices rely upon a wireless connection to an existing smartphone to completely function, but they indicate a continuous desire to place informatic systems in close proximity to the body and to human experience. These devices are not the purview of technology enthusiasts either. The market in supplementary devices such as wearable technologies (for example Fitbits and fitness trackers) and smartwatches are expected to double to over 150 million devices shipped per year before 2020 (Danova, 2014), and is an industry worth $20 billion a year and predicted to rise to $70 billion by 2025 (Harrop et al., 2015). Looking beyond wearable technologies, there is also the possibility of interface devices that are not just worn on the individual, but that cover and replace embodied sensory inputs. The logical progression of multimodal sensor interfaces, and pervasive digital networks, is towards a point where mediated perceptions and experiences are not additional features to a user's life, but a standard part of experiencing reality. This is promised in different ways through augmented and virtual reality technology. Graham et al. (2013: 465) describe augmented reality as "the material/virtual nexus mediated through technology, information and code, and enacted in specific and individualised space/time configurations", a combination of digitally mediated and networked information that is overlaid on an individual's perceptual environment. Although seeming farfetched, a number of examples of this are available. Google's Glass interface provides a number of computational and interactive functions via a display projected onto the lens of a pair of glasses. Virtual reality technologies such as Microsoft's Hololense, Oculus Rift, Sony Morpheus and HTC Vive promise to not augment a user's reality but provide a means to completely immerse the user in virtual, simulated perception. These devices, although on the horizon, indicate

the growing possibilities of interface technologies with the continuing development of devices that are data focused. They also illustrate how so many different relationships and contexts can be linked to data, and how central these relationships are.

## Part 2 — Data Circulation: The Dynamics of Data Flows

Where interfaces provide the means to create relationships mediated with data, circulation concerns the (im)mobility of data, and the movement and organisation of data in society. The large volumes of data created in society by interfaces do not remain fixed, and are not asocial. They are instead the subject of socio-technical patterns that seek to influence the flow of data. These patterns affect the relationships formed between individuals and groups, while also being an important site themselves in understanding society's relationship to data. This section explores the empirical and theoretical issues around the (im)mobility of data, and the resulting social patterns. First discussed are the new kinds of social relationships occurring through data networks, illustrating how data circulation can afford new kinds of socialities. Later discussion focuses on how variations in circulation (blockages, gaps and pools of data) can create new inequalities and power asymmetries in society, evidencing the importance of data (im)mobility within that society. Many of these developments hold a broader scope than discussion on interfaces, but are no less significant for individual users as they reflect back to the very conditions of individual life within digital societies.

### Networked Socialities — Living and Socialising through Digital Flows

With interfaces allowing data into everyday life, it is unsurprising that new forms of sociality have developed which leverage circulation. The modes of operation for both communities and individuals have changed with technology, with data networks woven into everyday social practices. Wellman (2001; 2002a; 2002b; Wellman et al., 2003b; Wellman et al., 2014) and Rainie and Wellman (2012) identify these changes as a part of what they call "Networked Individualism". They argue that a new

"social operating system" is in effect (Rainie and Wellman, 2012), which individuals must adopt in the network society. Individuals must independently create and leverage networks of their own creation in order to thrive (Rainie and Wellman, 2012; Wellman, 2002b)[10]. This networking behaviour is facilitated through computers and access to digital networks and platforms, and the mobilisation of these via personal devices (as discussed above regarding interfaces). These technologies allow networked and mediated interactions (internet, mobile and social media for example) to have a significant role in everyday life. As Foth and Hearn (2007: 757) state, "interaction and communication moves seamlessly between virtual and real communication spaces [for networked individuals]", even in shared co-present communities (like an apartment block). Through easy data circulation and interface devices (for instance smartphones) and the widespread availability of data networks, data practices become woven into how individuals and communities come together and operate (Boase and Wellman, 2006; Wellman et al., 2003b). Other studies lend support to the Networked Individualism thesis, with social networking sites positively related to increasing social capital in users (Burke et al., 2011; Ellison et al., 2007; Ellison et al., 2014b; Valenzuela et al., 2009), suggesting a growing centrality and usage of these networked services in maintaining and enacting social relationships. This not to reify the contributions of digital networks or Networked Individualism, nor assume that all users experience networked individualism in the same way. As Chua (2013) argues, the actual practices of networked individuals vary according to education, gender and ethnicity, and are contextually situated. What is common, however, is that data networks and data services (such as social media) are of increasing importance to how everyday people conduct their social relationships.

[10] Wellman (2002b) notes that the shifts in social networks represent a longer evolution of communities and social relationships, with events such as the Industrial Revolution, urbanisation and mass transportation all contributing to the formation of new kinds of social networks. Digital technologies are therefore not deterministic, but afford a new kind of network formation that is based on data circulation.

Another example of networked social relationships is described by boyd (2007; 2008b; 2014), through the concept of Networked Publics. Like Networked Individualism, Networked Publics highlights the importance of digital networks, particularly social media networks, in the construction of contemporary social and cultural spaces. As boyd (2010) and Hogan and Quan-Hasse (2010) state, social media networks provide new ways of circulating and managing social data. As with Networked Individualism, the networked properties of technology create a dispersed yet personalised network of mediated communications which hold significance for its users. boyd (2014: 8) argues this space can be considered a digitally networked "public", a shared and imagined community of practices and technologies. boyd argues that occupants of this space, particularly young people, use Network Publics to see themselves in relation to broader communities, and as a forum for their own community and social development and engagement. Network Publics can be a space through which shared cultures (Jenkins, 2006; Jenkins et al., 2013), political actions (Langlois et al., 2009; Papacharissi and de Fatima Oliveira, 2012; Russell and Echchaibi, 2009) and forms of identity construction (Greenhow and Robelia, 2009; Marwick, 2011; Papacharissi, 2010) are achieved through the affordances of digital media and social media services. boyd (2010: 46) specifically identifies four primary characteristics and contributions of digital and data services that have created Networked Publics, these being persistence (of data submitted online), replicability (data copies easily made), scalability (potential scope of visibility of data is high but varied) and searchability (data indexable and searchable). While these characteristics have given new opportunities to users to create social networks and digital media, they also present a number of concerns. The scalability of data means that users must consider the privacy implications of social data. This has a run-on effect to individuals' digital practices, as users must now manage against potential context collapses (boyd, 2008a; Davis and Jurgenson, 2014; Vitak, 2012) and the transmission of data beyond its intended field (discussed later in Chapter Eight). Young people are targeted as being particularly at risk, although this risk is often unfounded (boyd, 2014; Hodkinson, 2015; Marwick, 2012; Marwick and Ellison, 2012; Marwick, 2014). While emphasis is placed on social

media, Networked Publics are increasingly leveraging mobile technologies (logject interfaces for instance) in broadening and facilitating publics. As Ito (2012: 4-5) states, "with the advent of portable networked technologies such as the mobile phone and RFID (Radio Frequency Identification) tags, as well as location-based networked systems, we are also being forced to recognize information systems' relation to the materiality of diverse objects and places". Modern social relationships are therefore closely associated with data and digital networks, with the affordances of these new circulatory environments creating new opportunities (and challenges) for Informatic Persons, as expressed through their mediated social practices.

**Digital Divides — Blockages and Gaps in Availability, Use and Access**

A full account of the importance of circulation must also consider the idea of immobility. Discussion so far has established the prominence of socio-technical patterns where data movement is central, but they do not assume such movement is absolute. Circumstances in which flows are collected, held, restricted, prevented or curtailed are central to a complete understanding of networks and circulation. This is even more important given the centrality of networks in society, as Castells (2001: 247) explains:

> The centrality of the Internet [and data networks] in many areas of social, economic, and political activity is tantamount to marginality for those without, or with only limited access [...] as well as for those unable to use it effectively (Castells, 2001: 247)

The enormous positives of data circulation and network socialities must be considered alongside what happens when circulation is not absolute. Movement within networks is neither assured nor universal, and is a varied and dynamic aspect of the network. Just as networks and data flows can facilitate and further social connectivity, they can also be a means of limiting and isolating people.

Instances where circulation is limited or blocked are often conceptualised as a part of literature on digital divides. In these situations there are socio-technical absences or limitations that differentially impact upon populations, impeding the use or uptake of technology. Flows of data are subsequently blocked, throttled, or unevenly distributed by virtue of this, creating new dynamics of circulation. Discussion on digital divides generally approaches blockages and gaps in circulations from a position of inequality (DiMaggio and Hargittai, 2001; Mossberger et al., 2003; van Dijk, 2006), exploring the differences between groups with and without access to networks, and therefore also aspects of circulation. A large focus has been placed on digital divides, charting differentials and inequalities in access to the internet in different contexts (DiMaggio et al., 2004a; DiMaggio et al., 2004b; Hargittai, 2003; Norris, 2001; van Deursen and van Dijk, 2011; Van Dijk and Hacker, 2003; Van Dijk, 2005; Warschauer, 2002; Warschauer, 2004). The digital divide field is however fraught with difficulties and confusion. As Warschauer (2002), Van Dijk (2006) and Selwyn (2004) note, access represents only one element of a digital divide, and to a degree reflects an inaccurate and polarising binary between the internet as a have or have not. Hargittai (2001) suggests this reflects a "first level" approach to digital divides, with a "second level" representing not just access, but usage and how individuals manage online activities (see Chapter Six for more discussion on this). Subsequent research indicates differentials across groups of users, with factors such as age (Donat et al., 2009; Hargittai, 2010; Livingstone and Helsper, 2007; Millward, 2003; Rice and Katz, 2003; van Deursen and van Dijk, 2014), gender (Cotten and Jelenewicz, 2006; Jones et al., 2009; Liff et al., 2004; Selwyn, 2008; Terlecki and Newcombe, 2005), race (Hoffman and Novak, 1999; Jackson et al., 2008), socio-economic background (Talukdar and Gauri, 2011; Wei and Hindman, 2011; Zillien and Hargittai, 2009) and education (Goldfarb and Prince, 2008; van Deursen and van Dijk, 2014) illustrating social differences that impact use are beyond access. While grouped thematically here, many of these studies also identify combinations of separate demographic factors in producing these variations (Hargittai, 2010; Jones et al., 2009; Junco et al., 2010; Van Dijk and Hacker, 2003; Willis and Tranter, 2006). These studies have also largely considered the digital divide in relation to fixed-line data

networks (such as the internet), with less attention paid to mobile internet and mobile device inequalities[11]. Second level divides highlight how individual circumstances can contribute to patterns of inequality, further highlighting the individual relationships people have to data and data technologies.

A focus on an individual's interactivity, and on what data is produced, released and engaged with by a user, raises a potential "third level" of divide in the network society (Graham, 2002; Graham and Wood, 2003; Graham, 2004). This inequality uses information infrastructures to sort individuals based upon their worth (Graham and Wood, 2003; Graham, 2005), thus "adding friction, barriers, or logistical costs to the mobility and everyday lives of those deemed by dominant states or services providers to be risky, unprofitable, or undeserving of mobility" (Graham, 2004: 329). This inequality is less about gaps in the rollout and availability of networks, but is instead more about exploiting the mass circulation of data to identify and create inequalities that benefit ruling elites and privileged social groups. The capacity to achieve this kind of interactive inequality is contingent upon software and data infrastructure that can handle these data, and an individual's engagement within a system that potentially exploits them.

This is highlighted by boyd and Crawford (2012) in their discussion on Big Data (discussed in more detail below). They frame their analysis around the potential contribution of Big Data in society, where Big Data sets allow complicated data-analysis techniques, and new kinds of statistical insights. They note the potential for a divide between "Big Data rich" groups (who have enough capital to create or own large datasets, and the ability to use them) and "Big Data poor" groups (who lack the ability to access, use or process data). Andrejevic (2014) describes this as the "Big Data Divide", an asymmetry between individuals and the target of data collection, and those who collect and use

[11] For further information on this see Akiyoshi and Ono (2008), Brown et al. (2011b), Donner (2015), Pearce and Rice (2013), Rice and Katz (2003) and Srinuan et al. (2012).

data. Circulation is both exploited, through the enormous information density of network societies, and also restricted. The concept of Big Data Divides relies upon the enforcement of specific blockages and the formation of exclusive but extensive pools of data, where circulation is prevented or restricted to privileged groups. This is similar to Andrejevic's (2009) work on digital enclosures. He uses this term to refer to "the creation of an interactive realm wherein every action and transaction generate information about itself" (Andrejevic, 2009: 2), and the subsequent division between those who have control of these spaces and those existing within them who release their personal information via choice, coercion or force (Andrejevic, 2009: 3). Thus the formation of blockages and gaps in digital circulation are tied to an individual's digital relationships and potential contribution to inequality.

**Databases — Blurring the Lines of Circulation and Abstraction**

Central to the potential of "third level" digital divides, and critical to the dynamics of data circulation, are databases and forms of mass data storage that act as pools or reserves of data. While discussion on circulation may suggest fluidity is the dominant trait of data, how data are stored and held is vital to networks functioning, and the enactment of socio-technical relationships. At the level of infrastructure, data require material hardware (boyd and Crawford, 2012; Hayles, 1993: 148; Kallinikos et al., 2015: 102; Ruppert et al., 2013). Servers and storage devices (such as memory cards, USB drives and hard drives) are the repositories of vast sums of data, supporting the operation of the network. This gives data a materiality and permanence (Cote, 2014; Leonardi, 2010). Although networks emphasise distributed and non-hierarchal organisations of data flows, the removal of places in which data may be held would mean the collapse of the network. Thus places of data storage, such as archives or databases, are important and powerful aspects of network infrastructure.

The collection and storage of data, particularly through large digital databases, is thus an important socio-technical issue. Databases and archives are embedded in society, supporting many aspects of everyday social practice. For example, the transition towards internet and digital services that encourage user participation and contribution (what has been referred to as Web 2.0[12]) means that users are increasingly creating personal archives of information (Beer and Burrows, 2013). These archives can be volunteered through users engaging with internet services such as social media (Beer and Burrows, 2013; Hogan, 2010; Miller, 2008) and other individual tracking and data storage services (Copeland, 2015; Gemmell et al., 2006; Kaye et al., 2006). Database and data storage platforms provide the foundations for users to create personalised media collections (Beer, 2008; 2013; Nowak, 2014), including scrapbooks and photographic archives (Good, 2013), thus supporting many individualised digital culture practices[13]. Data are also, however, stored and held in databases involuntarily and without the knowledge of individual users. Vast infrastructures exist that collect and ultimately use personal information. For example, with users contributing more to internet services, their relationship to their data changes as this information often becomes the basis for economic profit for internet companies. They are what Ritzer et al. (2010; 2012) describe as prosumers, simultaneously consumers and producers of digital products and value. This reveals perhaps the most important issue around databases: the enormous power asymmetry between individual users and their personal digital practices, and those who collect and store personal information.

Users are tied into a relationship with databases by virtue of their digital practices, with everyday interaction being recorded and stored. This is already suggested above in discussion on “third level”

[12] For more detailed discussion on this see Allen (2013), Beer and Burrows (2007), and Lupton (2015a).

[13] As Manovich (2001) describes, databases are also a site of cultural expression, privileging certain presentations of information over others, whether this be in the choice of data input, or in the logic organising the archive.

digital divides, and has for some time presented an important socio-technical issue. As early as the 1970s, social researchers raised privacy concerns about the large-scale collection of records and personal information in databases (Rule, 1974). This issue has become even more prominent in digital networks where data creation and collection have become ubiquitous (Andrejevic, 2012). There exist numerous examples of databases in which personal information is held, ranging from databases of consumer habit and consumption patterns (Coll, 2013; Deville, 2012; Palmås, 2011; Pridmore, 2012; Ritzer et al., 2012; Zwick and Dholakia, 2004; Zwick and Knott, 2009), medical databases containing personal medical information such as DNA, biometric or diagnostic and research information (Alper et al., 2001; Chow-White and García-Sancho, 2012; Goldacre et al., 2000; Levitt and Weldon, 2005), to offender, security and policing databases (Garland, 1997; Jacobs, 2009; Lynch, 2002; Ruppert, 2013; Schneider and Martin, 2001; Tracy and Morgan, 2000). These examples are not intended as a summary of potential databases, but emphasise the significant role that databases have in the organisation of data networks, and the powerful relationship that these have to individual people. Every potential interaction of an Informatic Person can be recorded and stored in databases, and holds significant consequences.

## Part 3 — Data Abstraction: Big Data and Algorithms

Data abstraction refers to processes and techniques that manipulate data to achieve some kind of end. Where interfaces provide the portal for creating and sharing data, and circulation concerns the dynamics of movement, abstraction concerns how data are being used and enacted upon in society. Abstraction is entwined through the Informatic Context. For example, using social media like Facebook via a mobile device (and other examples of interface and circulation) is mediated via a number of algorithms. These algorithms abstract and analyse a user's data to create the experience of using the platform (Bohn, 2015; Franzen, 2014; Ingram, 2015; Sottek, 2013). Abstractive techniques not only create digital environments, but are also used to shape the user's relationships.

For example, Facebook manipulated users' information to create an algorithm that aimed to change the emotional state of users (Chambers, 2014; Kramer et al., 2014)[14]. Examples such as this demonstrate how data abstraction is linked into the Informatic Context, and can mediate everyday relationships. This section explores major examples of abstraction, including Big Data and algorithms, noting the growing impact of these practices on social organisations and relationships.

**Big Data — In Theory**

The most common and significant development in data abstraction is that of Big Data. Big Data refers to the use of incredibly large data sets to gain new insights upon a topic (Mayer-Schonberger and Cukier, 2013)[15]. Further explorations of Big Data have sought to highlight and uncover these specific qualities. Madden (2012b) describes Big Data as an evolution from traditional databases (discussed above) into a system defined by data that are too big (coming from many different sources at once, petabyte scale or bigger), too fast (requiring rapid to instant processing solutions), and too hard (using confusing or illogical data beyond the purview of traditional data analysis). New insights can be gained from larger, more varied and more rapidly collected data sets as a part of the trend of Big Data. This trend and the social context behind Big Data, however, is vague in these definitions. Kitchin's (2013; 2014b) analysis shares Madden's (2012b) and Laney's (2001) assessment of Big Data as being about velocity, variety and volume (the Three Vs), while identifying further qualities, such as a belief in exhaustible data collection (where n=all), and a desire for the highest resolution of data available. Data should also be flexible in nature as well, having increased

[14] Two separate groups of 10 000 users were randomly selected, and their Facebook feeds of incoming data and social media content where reshaped to either reflect more positive or negative content, in an attempt to raise or lower their emotional state. This was determined by analysis of their subsequent social media conduct.
[15] Big Data is a rather weak description however. As Manovich (2011) suggests, it is inadequate, revealing relatively little about the actual quality of Big Data. A dataset is not automatically Big Data just because it is big, neither is Big Data always concerned with super-massive data sets. This is where boyd and Crawford's (2012) discussion is helpful in unpacking what occurs around data.

extensionality (where new fields and types can be added easily) and scalability (changes in size can be made rapidly). These qualities are not just technical, but social.

As boyd and Crawford (2012) argue, Big Data is not a unified phenomenon, and is instead three interrelated axes that orbit and intersect data and society:

> (1) Technology: maximizing computation power and algorithmic accuracy to gather, analyze, link, and compare large data sets.
>
> (2) Analysis: drawing on large data sets to identify patterns in order to make economic, social, technical, and legal claims.
>
> (3) Mythology: the widespread belief that large data sets offer a higher form of intelligence and knowledge that can generate insights that were previously impossible, with the aura of truth, objectivity, and accuracy (boyd and Crawford, 2012: 663).

Big Data is socio-technical, with its significance lying not just in the technical work of data, but in the discourse of Big Data and its social and cultural position which has served to position Big Data as a powerful, yet unproblematic, addition to the digital society. It has been described as a social revolution (Mayer-Schonberger and Cukier, 2013), a paradigm that could provide "incalculable opportunities to make scientific research more productive, and to accelerate discovery and innovation" (Bollier, 2010: 40). For businesses and companies, Big Data has the potential to "extend the reach of organizations, improve management decisions, and speed the development of new products and services" (Bughin et al., 2010: 2), potentially restructuring related social and culture practices under this new data-focused economic paradigm (Beer, 2015; Brenner et al., 2010). The enthusiasm and promise of understanding data that are "too big to know" (Weinberger, 2014) has led to an uncritical deference towards Big Data and the social issues to which it relates (see above discussion on third-level digital divides for example), making boyd and Crawford's (2012) analysis so

important. Big Data also had a dark side, and potentially means new forms of inequality (discussed above) and threats to privacy (raised below). Given the implications it is therefore important that the relationships between Big Data, society and individuals' lives are critically understood.

**Big Data — In Everyday Life**

While Big Data can be viewed as distant from everyday life, the impacts of Big Data can be felt in many everyday institutions and activities. Manyika et al. (2011) suggest the use of Big Data can potentially add between $100 and $600 billion USD in revenue or market values to areas ranging from healthcare and administration to retail, manufacturing and the personal information economy. While emphasising the economic value of Big Data, Manyika flags how Big Data is associated with many everyday social experiences. Healthcare has leveraged Big Data to provide targeted healthcare programs for high risk or chronically ill patients (Bates et al., 2014; Bellazzi et al., 2015), to predict outbreaks of illness and conduct disease surveillance (Erekson and Iglesia, 2015; Hay et al., 2013; Ram et al., 2015; Signorini et al., 2011) and to analyse large amounts of biomedical data generated across the medical science disciplines (Bellazzi, 2014; Margolis et al., 2014; Weber et al., 2014). While public discussion on Big Data and healthcare often centres around patient records and their analysis (Larson, 2013), Andreu-Perez et al. (2015) identify numerous developments in medical informatics, imaging, medical sensors and data translation (cross-disciplinary data sharing) that can benefit healthcare through Big Data techniques. According to Murdoch and Detsky (2013) the trajectory of healthcare and data is such that the integration of Big Data is inevitable, as Big Data offers the most effective means to solve many problems (Andreu-Perez et al., 2015). Therefore every interaction an individual has with the healthcare system has the potential to become a data point in the new data-driven infrastructure of modern medicine.

This sentiment is reflected in the use of Big Data by businesses. The interactions of employees, consumers and of products are all the purview of enormous data sets and analytic techniques. These

range from aspects of market/business intelligence operations (Chen et al., 2012; Minelli et al., 2012), such as management task or operational duties in business and industry (Chaudhuri et al., 2011), to customer relations management systems that monitor relationships, sentiments and preferences, and provide customised responses to business and customers (Bughin et al., 2010; Kambatla et al., 2014; Schmidt, 2013). Companies and governments have also begun to apply Big Data to the infrastructure and organisation of cities (Batty, 2012; 2013; Graham, 2004; Kitchin, 2014a; Townsend, 2013). Zaslavsky et al. (2013) believe this comes from the growth of sensor devices (that is, interfaces) in urban environments that provide new levels of data volume and quality. Hancke et al. (2012) list numerous examples for sensors and Big Data, including datafied utilities distribution (Asmus, 2010; Sum et al., 2011; Zanella et al., 2014), smart transport grids (Debnath et al., 2014) and smart homes (Gungor et al., 2012; Wilson et al., 2015), as potential digital urban developments [16]. Discussion on sensors, however, also reveals spaces in which the relationship between Big Data and everyday life is more contested. Surveillance Studies for example, has the capacity of Big Data to be a surveillance tool, with both governments and private organisations adopting these practices (Andrejevic and Gates, 2014; De Goede, 2014; Greenwald, 2014; Lesk, 2013; van Dijck, 2014; Wigan and Clarke, 2013). In the face of surveillance fuelled by Big Data, Lyon (2014: 4) states that the potential for surveillance is "expand[ed] exponentially —[in that] it renders everyday life increasingly transparent to large organisation. The corollary, however, is that organisations engaged in surveillance are increasingly invisible to those whose data are garnered and used". The enormous availability of data, and the descriptive value held therein, means Big Data presents many challenges for definitions of privacy (Cavoukian and Jonas, 2012; Polonetsky and Tene, 2013; Schadt, 2012; Tene and Polonetsky, 2012). As Crawford and Schultz (2014: 99) argue, the issue with Big Data rests with the scope of data collection and its abstractive capacity. Limiting or controlling large and highly mobile sums of personal information is difficult, and the results of the

[16] Hancke and Hacnke Jr's (2012) full list of developments includes smart examples of infrastructure, surveillance, water/electricity distribution, buildings, healthcare, services and transportation.

algorithmic and abstractive techniques are unpredictable, known only after analysis is completed. This means it is difficult to protect one's privacy when risks are high and potentially unknowable. Additionally, the results and quality of data means that individuals are becoming increasingly identifiable through a variety of data traces (Andrejevic, 2013). As Wu et al. (2014: 105) state, collecting and using individual's preferences and locations (standard elements of Big Data), present long-term privacy issues, requiring data to undergo several levels of modification before being considered anonymous. It is unclear if these measures can even be helpful, as Big Data aims to present targeted judgments (sometimes false or innocuously based) that can have significant impacts on life chances (Crawford and Schultz, 2014). Surveillance has traditionally been something conducted with specific attention to detail (Lyon, 2007a), however the potential to understand large volumes of data means private and public organisations are now orientating themselves toward ubiquitous data (Andrejevic, 2013; Andrejevic and Burdon, 2015). In the age of Big Data, surveillance has grown from a targeted enterprise, placing many in the Informatic Context in a relationship with surveillance.

**Data Manipulations and Everyday Life: Algorithms, Analytics and Simulations**

A crucial element to understanding Big Data are the techniques and algorithms used in data analysis. While powerful computer hardware is required for Big Data analytics, algorithms and forms of software[17] are also required to handle and interpret large data sets (boyd and Crawford, 2012; Fan and Bifet, 2013; Kitchin, 2014b). Introna and Wood (2004: 180) describe algorithms as a set of logical, mathematical instructions, a foundational part of modern mathematics[18]. As Lessig (2006)

[17] Taken for granted here is that software includes code, or the language necessary to compile software and analyses of data within a computer system.

[18] Although discussion here places them in relation to computer and data enterprises, algorithms are not native to computers (although they are essential to them). This reveals the importance of code in understanding algorithms, with computer code and programming languages being essential to the existence and operation of algorithms and digital systems (Introna and Wood, 2004).

describes, they are the laws and regulations of the digital reality and are essential for the operation of computers and digital infrastructure. The importance of algorithms is, however, not just about the technical side of computers, as they must be coded into digital systems in order to function. This work is conducted by humans and other pieces of software, thus making algorithms and codes a site of social activity and conflict (Lenglet, 2011; Mackenzie and Vurdubakis, 2011). The power of such codes lies in their performativity, the capacity to make things work, to perform and enact (Hayles, 2005) or what Galloway (2004) describes as executability. As Mackenzie and Vurdubakis (2011) state, this simultaneously allows not only a new possibility of order, management and creation enacted through the fluid and easily modulated space of code (Deleuze, 1992) but also new avenues of disorder and uncertainty. For example, they describe how algorithms allowed the modelling of the complex mathematics required to build nuclear weapons, resulting in an even more uncertain situation of having such weapons (Mackenzie and Vurdubakis, 2011). Codes, algorithms and software are therefore an intrinsic part of computer systems and socio-technical environments. They are not just socio-technical in that they are created in a human and social context, but they are increasingly contributing to, and creating, social and technical relationships within today's Informatic Context.

Algorithms are often an invisible part of many socio-technical and informatic situations[19]. They sort the social media communications and content a user receives (Bucher, 2012; 2013; Ellison et al., 2014a; Eslami et al., 2015; Hamilton et al., 2014; Van Dijck and Poell, 2013), they determine credit ratings (Rona-Tas and Guseva, 2013), they predict consumer movements and preferences (Hallinan and Striphas, 2016; McEnnis and Cunningham, 2007; Steiner, 2012; Webster, 2010) and security risks (Graham and Wood, 2003; Pötzsch, 2015) yet are closed off from individual access or

[19] As Pasquale (2015), Graham et al. (2013), and Introna and Wood (2004) note, the invisibility of algorithms contributes significantly to their potential for negative consequences, just as much as it does their productive potential.

comprehension. Even for social systems that receive constant attention, such as the economy and financial markets, their enactment and everyday functioning is tied to data abstractions and automations (Callon, 2005; Lenglet, 2011; MacKenzie and Pablo Pardo-Guerra, 2014; Wyly, 2013). Algorithms have a particular utility in sorting large amounts of data and presenting customised responses from these data. This is evident in the adoption algorithms by online retailers. For example, digital super-retailer Amazon makes extensive use of algorithms in its recommendation and pricing system (Ghose and Ipeirotis, 2006; Leino and Räihä, 2007; Linden et al., 2003) which allows rapid adjustments in price in response to demand and stock levels (a practice called robo-pricing (Warman, 2012)). Striphas (2011) suggests that the warm reception that algorithms have had in these fields comes from their ability to provide quantifiable answers to cultural problems, a part of what he and Galloway (2004; 2006) describe as an "algorithmic culture". They argue that computational processes sort and classify data about people, behaviours and objects and, in doing so, shape human conduct and relationships. This is clearly visible in the interactions people have with search engines, as these complex but contested systems shape the presentation and reception of information (Granka, 2010; Introna and Nissenbaum, 2000). Journalistic institutions are increasingly relying on algorithmic culture and automation to manage and create content (Carlson, 2015; Coddington, 2015; Diakopoulos, 2015; Napoli, 2014; Young and Hermida, 2014), with many daily news articles in circulation potentially written by a program. Even when it is the product of humans, the reception of such material is often determined by algorithms (Carah, 2015). This contributes to the potential blockages and limitations in data circulation (as described above in Part Two), as algorithms act as a means to limit personal content in the digital space. Although sometimes invisible, algorithms and data manipulation practices are powerful elements in arranging society.

While helpful, algorithms are fraught with complications, with potentially significant social consequences. van Dijck (2014) and Andrejevic (2013) argue that Big Data (and techniques like

predictive analysis) create an epistemological order idolising data. Because of the ability of algorithms to interpret large amounts of data (particularly data mining and predictive analysis) and present these insights in a meaningful way using predictions of likelihood and possibility, Andrejevic (2013) argues the need to understand causal relationships in society is diminished. This creates a "'post-comprehension' strategy of information use that address the challenges posed by information overload" (Andrejevic, 2013: 87), with correlation defeating causation. Predictions and correlations are viewed as more valued means of understanding the world through data, despite potentially being detached and non-"referential" (Andrejevic, 2013: 40) to the real world. This means the judgments and treatment of individuals in the informatic age increasingly reflect the potential for individuals to act, and not their actual actions (Cheney-Lippold, 2011), with only those few able to directly engage with the algorithms and databases able to overcome this issue. This feeds into earlier discussion on third-level digital divides, where access and understanding of databases and algorithms is limited to a powerful few. Pasquale (2015) indicates these circumstances are widespread, describing how this arrangement of algorithmic judgment is prevalent in many aspects of everyday life, a part of what he describes as the "Black Box Society". While rationalised as representing a superior "data-driven" approach to the world, he describes algorithms as subjective and often biased in favour of social elites (Selinger, 2015). This critiques the assertion that algorithms are an objective, data-driven means of enacting society. For example, the use of algorithms in so-called "high frequency trading" in finance, where commercial actions are made at the microsecond level, is entirely fallible. Arnoldi (2015) notes that the algorithms that govern and make financial transactions are largely naive, being faster than humans but not smarter, falling victim to human attempts to manipulate the market. These problems occur with little recourse or visibility, which is very concerning given the expansion of automated and algorithmic systems in everyday life. Members of society are caught between the potential facilitations and help of algorithms and their potential harms, making algorithms critical to understanding the Informatic Context.

**Everyday Data Practice: Small Data and Intelligent Personal Assistants**

The use and abstraction of data are not solely the purview of large Big Data systems held by corporations or governments, but are also a growing part of ordinary people's engagement with data. This is found in the development of more individualised approaches to Big Data, such as Small Data and the introduction of "Intelligent Personal Assistants" to personal interfaces. The presence of such algorithmically driven systems flags an appropriation and incorporation of data manipulation processes into everyday life, and speaks to the relationship of data to everyday life.

As discussed above regarding interfaces, developments in wearable technology and quantified-self devices have provided numerous opportunities for individuals to capture their own data (Kitchin and Lauriault, 2014; Pollock, 2013). Combined with ample computer power and network access, it is entirely possible for individual users to run and maintain their own data-analysis regimes. Small Data approaches contrast the Big Data movement by aiming to be open, comprehensible to ordinary persons, and usable by said persons, utilising data from Big Data and locally sources (Small Data Group, 2015)[20]. The desire for new insights through data remains, but it does not use the same volume as Big Data[21]. Academic discussion on Small Data has reflected this, with Kitchin and Lauriault (2014: 4) noting its focus on "specific cases and tell[ing] individual, nuanced and contextual stories" through data. Existing self-tracking, quantified-self and personal analytic approaches that capture individuals' digital traces provide a foundation for this[22] by adopting what Estrin (2014) describes as an "n=me" approach to data analysis, where "[digital] traces could serve to greatly enhance all of those with personalized data-driven insights—insights ranging from early warning signs of a problem, to indicators of gradual improvement [on a personal experience such as health]" (Estrin, 2014: 33). Compared to literature on Big Data, relatively little exists on Small Data. A lack of

[20] The exact phrasing used in their mission statement is accessible, understandable and actionable.
[21] Weinberger (2014) has described Big Data as a means of handling data that are "too big to know" for human users, whereas Small Data aims to be "small enough to know".
[22] As discussed above, but also see Lupton (2014a) for further information..

literature, however, does not undermine the importance of personalised data-manipulation practices. Social practices around data abstraction are not just the scope of Big Data, but a part of individual social practice.

Another subtle example of the intersection between everyday life and data-abstraction techniques is through the integration of so-called “intelligent personal assistants” to some smartphones and computer devices. Most famous of these is Apple Computer’s “Siri” function on iPhone devices (Apple Computers, 2015; Aron, 2011), a voice-activated software assistant that is capable of responding to simple voice questions and requests (such as making phone calls and replying to messages). Google’s “Google Now” application provides a similar functionality for Android users (Google, 2015) but further expands the analytical possibilities, using data mining to personalise responses to questions, and drawing upon stored personal data to anticipate and predict the user’s actions (Olivarez-Giles, 2015). For example, the application can register patterns in a user’s activities (such as the commute to work) and provide contextual information and applications based on other users or previous experiences (such as preferred songs for the drive using a third-party music application like Pandora or Spotify). Microsoft (2015) has also deployed its own assistant application, Cortana, which promises similar functions on the Windows platform, with integration into the Windows 10 mobile and personal computer environment. Amongst the features included in Cortana are geographically and culturally located “personalities” that change responses depending on location (Kedmey, 2015), illustrating a broad suite of predictive abilities available to monitor the digital traces of a user. Critiques and inquiries into these systems are currently rare, given the novelty of the system. For example, Siri and Google Now are often discussed in relation to user experiences and the voice recognition aspects of the program (Bellegarda, 2014; Lemon, 2012) as an example of product innovation (Dahlin, 2014) or in relation to privacy (Lyon, 2014; McMillan and Loriette, 2015) but are not themselves the centre of analysis. Instead they are often understood as indicative of broader trends (such as the Internet of Things or mass surveillance) and not the sole

focus of research. This presents an interesting gap in how algorithms and data manipulations are understood. The earlier discussion on algorithms emphasises their place within institutional and social structures, however systems like Google Now cross the boundaries between individual lives and these social structures. They connect an individual to systems of Big Data and individually sanctioned analytical and predictive responses based on their digital traces using Google's enormous databases (Lyon, 2014). Intelligent personal assistants are therefore an emergent example of data-manipulation practices in everyday life and society's relationship to these practices.

## Conclusion

The current socio-technical context is dominated by data and relationships in which data are implicated. Data interfaces, data circulation and data abstraction have made significant contributions to society and provide the basis for many social relationships and organisations. For ordinary people, many of these relationships come through interfaces' technologies, such as mobile phones and smartphones, but also more recent wearable devices. These devices provide a means of receiving and transmitting data, of digitising society and act as a portal to the informatic society (Goggin and Crawford, 2010). They create a relationship between members of society, data and data networks. Such data do not remain within an interface, but are instead in circulation through networks in society. These patterns of circulation provide the basis not only for new kinds of social relationships and practices but also for new inequalities and power asymmetries. Through an interface and subsequent data circulation, numerous intersections are made with much broader assemblages of data that can have significant consequences. Data-abstraction practices illustrate this, with the ability to manipulate data to generate novel insights that create numerous implications for data in society. It is for these reasons that it is appropriate to think of society in terms of being informatic, and of data as having a central place in the organisation of society.

This chapter has illustrated the critical presence of data in society across these three axes, and the numerous relationships to data present in society. The question remains, however: what do these relationships mean to society and those who experience them? Data are important because they can connect many different socio-technical trends, creating a synergy between the different relationships and elements in society. Interfaces, circulation and abstraction are all individually significant, but are most powerful as they come together to create contexts and relationships that feature all these elements. The nature and quality of these relationships is the focus of this thesis. With the empirical background developed for these axes, the next chapter develops the theoretical justification for exploring these ideas and the synergy they create. This Informatic Context and the Informatic Persons are the concepts used to understand this, and are defined by their relationships to data. The nature of these relationships for Informatic Persons is discussed in the later chapters of this thesis.

# Chapter 3 — Conceptualising the Informatic Context and Informatic Person(hood)

## Introduction

The diversity of empirical and theoretical accounts of data and data technologies means that exploring these topics requires a targeted and specific conceptual approach. This chapter presents a novel conceptual framework to achieve this, and proposes the concepts of Informatic Personhood[23] and the Informatic Context to accomplish this. These concepts describe the position and relationship of data and data technologies to individual persons, and how these relate to broad socio-technical patterns. The Informatic Context is the set of structural and socio-technical trends that have elevated data and data technologies to a place of significance. Three factors define the Informatic Context: data interfaces, data circulation and data abstraction[24]. Informatic Persons are those individuals who exist within this context. They are the people created as society intersects with the three factors of the Informatic Context and their associated relationships and interactions. The concepts of Informatic Personhood and the Informatic Context have a great deal of overlap as the Informatic Context is formed by the actions and choices of people, and the Informatic Person is informatic by virtue of structures in the Informatic Context. While overlapping, it is often the case that the Informatic Context can precede the Informatic Person. An individual or group of people may choose to reject all data technologies, but through living in a society where these technologies are so prevalent they find themselves connected without their awareness. For example, walking down a public street may mean that one's face and gait are captured by Close Circuit Television (CCTV)

[23] Informatic Persons and Informatic Personhood are the same concept. Informatic Personhood is the state of being for the Informatic Person or Persons, while Informatic Person(s) is/are a specific example of Informatic Personhood. These phrases are used interchangeably. To refer to an Informatic Person (or Persons) is to refer to Informatic Personhood, and Informatic Personhood describes Informatic Person (singular or plural).
[24] Also referred to as simply interfaces, circulatory or abstractive practices.

cameras, and analysed and shared by digital tools used by security agencies or private companies. The Informatic Context is therefore the social space and background to individual action.

It is also important to note that Informatic Personhood and the Informatic Context are not theories of personhood, identity or ontology. They do not require an individual to explicitly state their intention to join Informatic Contexts, or to become an Informatic Person. As the example of CCTV above demonstrates, individuals or groups may find themselves as Informatic Persons and living in an Informatic Context without their knowledge or awareness. These concepts instead act as heuristics for capturing relevant socio-technical and sociological elements. Neither concept represents an overarching theory on the condition and mentality of modern subjects or societies. They are loose conceptual tools used to contextualise sociological issues around data and technology, as relevant to an ordinary person.

This chapter presents detailed accounts of the Informatic Context. The three elements of the Informatic Context (interfaces, circulation and abstraction) are explored in detail, noting how they intersect with everyday life and society to create the conditions for Informatic Persons and their mediated relationships. Interfaces are identified as means by which everyday life is increasingly digitised, as technologies increasingly mediate and translate the practices and environment of individuals into different, informatic, circumstances. Once translated into digital traces, circulation captures the dynamics of data in society and the various mobilities and immobilities that are involved. The flipside of circulation is abstraction, as the movement of data nearly always has a purpose. Abstraction concerns the contemporary uses and manipulations of data, and the kinds of work and practices that are being performed with an individual's data. Discussion on abstraction and circulation in particular highlights the sociological significance of data, with both elements revealing emerging dynamics of power and social organisation that shed light onto the individual in contemporary society. How these elements relate to persons within this context is described in the

final section on Informatic Persons, where the importance of considering these trends in relation to everyday practice is advanced.

## The Informatic Context

The concept of the Informatic Context aims to identify the key socio-technical developments that structure digital societies, defining the stage in which social actors (that is, Informatic Persons) play out their lives. This stage requires a close attention to data and data technologies. It is developed from Hayles's (1999) definition of the informatic, and how data and digital systems are entwined in the operation of nearly all aspects of a society:

> "By 'informatic[s]', I mean the material, technological, economic, and social structures that make the information age possible. Informatics includes the following: the late capitalist mode of flexible accumulation; the hardware and software that have merged telecommunications with computer technology; the patterns of living that emerge from and depend on access to large data banks and instantaneous transmission of messages; and the physical habits — of posture, eye focus, hand motions, and neural connections — that are reconfiguring the human body in conjunctions with information technologies" (Hayles, 1999: 313)

Hayles's (1999) definition is important because it not only seeks to highlight the scope of data and data technologies in everyday life, but how these systems are socially integrated and effecting social change[25]. She suggests a majority of social structures, such as modern economic systems, are now linked to data technologies. Data are moved and shared between different social systems, and form the basis of new social structures and "patterns of living" (Hayles, 1999: 313) such as in the rise of

[25] It is for this reason that data and digital technologies are often referred to here as being informatic instead of digital, and is the structuring idea of this thesis. The terms "informatic" and "informatic technology/technologies" are also used interchangeably with "digital" and "digital technology/technologies". References to "Informatic Contexts", and the "Informatic Person" have specific meanings however.

databanks and mass communication. Exploring the sociological contributions and affordances of recent data technology is vitally important, as Burrows and Beer (2013) argue, indicating that a greater focus on the informatic situations will provide a new vocabulary for social analysis[26]. Part of this is, however, recognising that data and data technologies are only meaningful in how they enact society, a point further developed by Hayles (1999) in how the human body is modified and enacted by intersections with technology. Thus a focus on the informatic means placing equal importance on both social actors and organisations, and the digital and technical systems present.

The three elements of the Informatic Context, data interfaces, data circulation and data abstraction, are developed from Hayles's (1999) ideas to create a conceptual frame that can more clearly identify and investigate data technologies in the contexts of a society. As illustrated in Figure 1, these elements are interrelated, feeding into one another to create the Informatic Context. They are connected and related through the movement of data, with the various movements of digital information linking them together. Each element is of equal value, and they are not hierarchal. In many instances the boundaries between these categories are porous, with significant spill over present. For example, Big Data uses complex statistical techniques to analyse data and achieve social outcomes, making it a form of data abstraction. It is also an example of circulation, as it relies on the creation, movement and storage of vast sums of information. Big Data cannot work without a means of digitising information, a function that interfaces provide. This flexibility and openness reflects the often confusing and tangled nature of contemporary socio-technical developments (for more on messiness in the social nature of computing see (Dourish and Bell, 2011a), and thus the boundaries of the Informatic Context are not applied rigidly.

[26] Burrows and Beer's (2013) argument focuses specifically on Urban Informatics, a sub-discipline of Informatics focusing on the role of digital and information technologies in relation to urban spaces. While their argument aims to highlight how Urban Informatics can provide sociology with a nomenclature for understanding urban social spaces in the context of data technologies, it is the general suggestion of focusing on the intersections of sociology and data technology that is of use here.

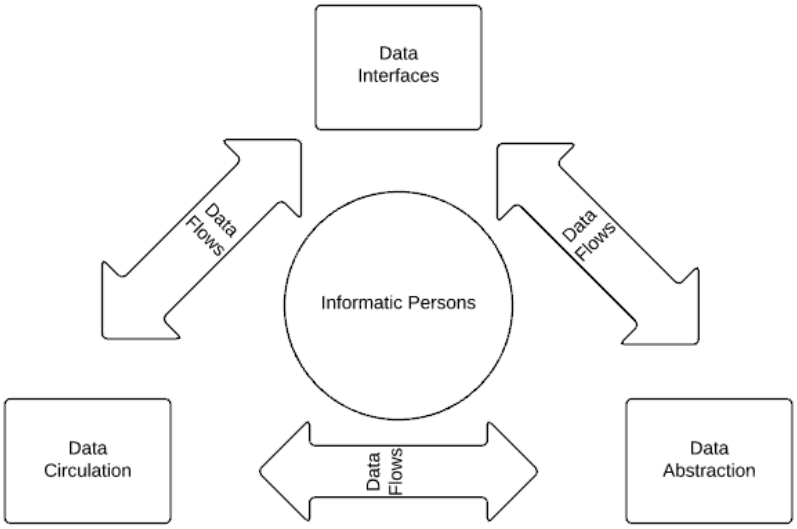


**Figure 1: Summary of the Informatic Personhood Model**

Through these three elements the Informatic Context provides a conceptual frame for exploring the circumstances of technology use in society, and for answering the question of what it means to live in the context of data as an Informatic Person. In the following sections the specifics of the three elements of the Informatic Context are developed. Definitions and justifications for their inclusion are provided, with a focus on developing these ideas to help better understand how people are rendered into Informatic Persons.

## Interfaces

Interfaces are things that connect and translate something across different contexts. With the focus here on data, this means that interfaces are those devices, systems, infrastructures and objects that connect social actors (individual or collective) to a context of data. They are the means by which data are created, shared, received and utilised in society, connecting a social actor into the broader

assemblages of socio-technical entities that are concerned with data. They are the portals through which data moves in society (Goggin and Crawford, 2010).

The sociological significance of interfaces here lies with the new kinds of connections they make between different socio-technical entities, and what these relationships might mean. In the words of Latour (2005), interfaces are not intermediaries and do not replicate inputs/outputs of a system without contribution. Rather, interfaces are mediators that effect change into that context. The potential changes an interface can make are manifold. As Galloway (2012: 121) states, an interface "produces an autonomous zone of interaction, orthogonal to the human sensorium, concerned as much with unworkability and obfuscation as with connectivity and transparency". The interface itself is a special socio-technical site that creates or performs reality by making connections. It is for this reason that interfaces are not simply thresholds between two separate others, as this does not capture how an interface is located in a socio-historical and cultural situation which it helps to create (Galloway, 2012: 30). The importance of understanding interfaces as contributing to social reality is also foregrounded by de Souza e Silva and Frith (2012) who, in exploring the role of mobile technologies in urban space, argue that interfaces (particularly mobile technologies) are a means by which socialities are filtered for their users. They become "social interfaces" (de Souza e Silva, 2006) that reshape the relationships and interactions present in this space.

Interfaces do not necessarily have to be digital to achieve this, but afford new relationship-mediating capacities through data and data technology. The non-digital roots of interfaces are also noted by Manovich (2001) and Johnson (1997). Manovich (2001) in particular argues that digital technologies should be considered as "cultural interfaces", as a hybrid cultural object evolved through previous cultural ideas[27]. As de Souza e Silva and Frith (2012) note, a paper book is an interface, as reading in

[27] For instance, in Manovich's (2001) view the graphic user interface (GUI) that connects a user to the digital hardware of a personal computer borrows cultural conventions about space, depth and time from different cultural mediums (particularly cinema and literature) in creating the space where digital action occurs. This influences the potential of the technology itself, as burgeoning functions like data analysis, manipulation and

a public space filters out external stimulus in favour of the narrative of the text, changing the reader's relationship to the urban space. However, new data-orientated affordances change the potentials of interfaces and the kinds of relationships that stem from them. de Souza e Silva and Frith (2012: 41) note the multivalent sensory abilities of interfaces such as smartphones, and their audio, video and even haptic feedback (i.e. movement and vibration capacities as being crucial for this). Interfaces are no longer passive objects in the world, being instead what Galloway (2012: 22 - 3) describes in terms of an "ethic", or how interfaces contribute to the actions of the world around them while simultaneously being a product of the conditions of this world. As Farnman (2012) develops, interfaces are nexus points for creating embodied social spaces and relationships, particularly through new media and mobile technologies. They are instruments for creating what Farnman (2012: 33) calls a "sensory inscribed body ", a body that is understood as much by experiential and phenomenological practice as it is by digital and informatic signification. As Hjorth and Gu (2012; 2013) have argued, thinking of interfaces in terms of their embodied practices is hugely beneficial to capturing their social significance. In these instances the impact of interface technologies on society is clearly visible in how they create new social relationships and cultural practices built on the contributions of interfaces. They also demonstrate the relevance of interfaces in understanding the personhood of people living with interfaces' technologies.

The new capacities of interfaces to create and modify relationships and social spaces is explored by Kitchin and Dodge (2011) who argue that many everyday objects act as interfaces, possessing digital qualities that change their relationship to users and social space. Data and software are increasingly incorporated into everyday technologies, changing them from "dumb" to "smart" devices, as they engage more with data, or more specifically targeted pieces of data or capta (Kitchin and Dodge, 2011: 99). Depending on how an object is encoded with software, the relationship a device may

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simulation are understood through this cultural lens. This is empiricised in his discussion on digital gaming, where complex and dynamic programs are represented in a graphical manner matching expectations of cinema. The GUI is an interface that is reliant on and understood only through adherence to previous cultural standards of graphics, thus being a cultural hybrid.

have to space can change, becoming more addressable (specifically identifiable to both human and other nonhuman objects, what is referred to elsewhere as machine readable), aware (of their environment and interactions or relationships around them) and active (engage in interactivity or practice, often with capta). Devices cease being defined as singular, functional objects and are instead being increasingly networked and multidimensional. This is summarised in Table 1:

**Table 1: Summary of Relationships Between Code and Material Objects**

| **Object** | **Description** | **Example** |
|---|---|---|
| Peripherally Coded Object | Embedded or incidental software, non-dependent to operate | Digital clock |
| Hard Codeject | Software/capta-dependent object, code is unable to be altered | USB stick firmware that allows use in any USB slot |
| Unitary Codeject — Closed | Programmable and interactive software/device, can be altered. Self contained | DVD player or audiovisual equipment |
| Unitary Codeject — Sensory | Same as closed codeject but open, is aware and responsive to external stimuli using | Air conditioning units, regulating temperature |

| | | |
|---|---|---|
| | code/software | |
| Logject — Impermeable | Self-contained codeject that records capta around their use and status. Capta logs retained for possible use. Logs and stored catpa not automatically networked. Possible potential for networking | Blackbox flight recorder |
| Logject — Permeable | Same as above impermeable logject, except networking potential is certain, although must be actively enacted | Personal GPS unit |
| Networked Logject | Same as permeable logject, except cannot function without network use, constant two-way exchange of capta | Smartphone, quantified-self device |

Adapted from (Kitchin and Dodge, 2011) and (Burrows and Beer, 2013)

By being imbued with the ability to autonomously and automatically interact through data, everyday objects must be considered more closely as interfaces, and in terms of their connections and mediations of social life. For Kitchen and Dodge (2011), increased networkability and data reliance represent a transduction of space where code and capta have become inseparable from performing the functions and meanings of social space (Kitchin and Dodge, 2011: 71), a part what they call "code/space" given the reliance on data in society. Relationships and social practices are modulated through code/space and coded objects as a part of everyday assemblages of relations in an increasingly automated manner (Kitchin and Dodge, 2011: 74). They further argue that this constitutes a new form of governmentality called automated management, where social control is automated (achieved via nonhuman technologies), automatic (technology controls without external orders) and autonomous (occurring outside of human oversight). Burrows and Beer (2013) argue that the contribution of coded objects, from their networkability to their operational reliance on code, change the nature of the interface as the parameters for connecting and translating two separate spaces are altered with digital technologies. This highlights the material affordances of digital technologies, and the importance of considering the properties of the medium by which interfaces are built, as they influence the constitution and quality of the spaces created once connected. The theoretical need to consider this is made even more pressing with the realisation that the growth of the interface is only just beginning. As Greenfield (2010) argues, there is the possibility for the development of everyware, or a convergent paradigm of ubiquitous and pervasive computing principles where data and information technologies are included naturally in every human reality. Digital interfaces, as connectors between human and digital contexts, would essentially cease to exist in this vision, as digital connectivity becomes the default and underwritten into the operation of society. Increased digital functionalities change that ability of technology to

make connections and contributions to society. Conceptualising these devices as interfaces, and focusing on how data mediates and creates relationships, helps unpack these recent developments and explore Informatic Contexts.

The need to do this is increasingly urgent as new social patterns emerge that leverage interfaces as a part of their operation. For example, Andrejevic and Burdon (2015) argue that modern societies must be conceptualised as “Sensor Societies” because of the prevalence of sensors, objects that collect and monitor data. Devices such as smartphones, location-aware technologies, Radio Frequency Identification enabled objects, wearable technologies and quantified-self devices, and even drone-mounted environmental sensors, are all examples of sensors. These devices do not use data in a purposive and targeted manner, but rely on ubiquitous data collections through pervasive networks of interfaces. This highlights how interfaces do not necessarily rely on the conscious awareness and intention of users to make connections, and change the relationships they have to social space. As Gane and Beer (2008) note with pervasive devices like sensors, while often focused on a specific user or group, human recognition and engagement (that is, practice) are not necessary in the definition, prominence or contribution of interfaces. They point to Mitchell’s (2003) notion of “urban information overlays” as an example of how “the miniaturisation of the physical form [of interfaces creates] new media to the extent that we hardly notice them” (Gane and Beer, 2008: 62). The relationships to which interfaces contribute, and influence, are not automatically those immediately related to the practices of a user (or social group). Instead the informatic nature of interfaces, like Kitchen and Dodge’s (2011) logjects, shape the very fabric of society through their use. In the case of sensors, Andrejevic and Burdon (2015) note social changes such as the political economy of data, increased acceptance of surveillance and monitoring, and new regimes and directions in social control as a result of the mediation of these interfaces. Emerging social orders are already exploiting the potential of interfaces to connect, share and create data to achieve their

aims, forging contested, data-intensive relationships. Exploring interfaces is thus central to understanding recent social contexts.

## Circulation

Circulation concerns the dynamics and movements of data and information in Informatic Contexts. Where interfaces are those socio-technical sites by which individuals are connected to data and digital contexts, circulation reflects the architecture of these contexts and the movements of data between associated actors. Circulation seeks to highlight the dynamics of data between different techno-social actors and organisations and, through this, how the movement of data contributes to new kinds of socio-technical relationships. Interfaces provide a platform for creating new relationships through data, but these relationships cannot be realised without the processes of circulation moving data. Just like interfaces, processes of circulation are mediators, and contribute in some way to the quality of relationships created within the Informatic Context. With more data being created and circulated than at any other point in human history (IBM, 2015b), especially concerning personally identifiable information (Gantz et al., 2008; IBM, 2015a), the importance of comprehending the circulation of data is critical to understanding the Informatic Context[28]. The concept of circulation is particularly helpful because it explores the social structures and

[28] IBM (2015a) calculates that more data are in circulation in 2014 and 2015 than in the whole of human history. Additionally, as of 2008, statistics indicate that the daily volume of data processed by web giants Google exceeds 20 000 terabytes a day (Dean and Ghemawat, 2008), an amount equivalent to processing 1333 copies of the entire Library of Congress (Kitchin, 2014b: 69). The rapid movement of data is not isolated in society, but widespread, with Brown et al. (2011a) reporting that 15 out of 17 sectors within the economy of the United States now have businesses (for-profit organisations with 1000 or more employees) that on average move over 235 terabytes of data as a part of their operation. Individual users contribute approximately 30+ petabytes (30 000 terabytes) of social, user-generated content to a single social media platform (Facebook) as a part of everyday life (IBM, 2015b). Another estimate by Gantz et al. (2008) suggests that each individual has a digital footprint of at least 45 gigabytes (approximately 150 030 books, each comprising 300 pages) of personal data, a figure likely to have increased massively since publication of this statistic.

organisations that come with digital and information technologies, particularly the reorganisation of societies around networks, and the dimensions of power that come with data.

Networks are an example of the dynamics of circulation, and refer to any kind of organisation, pattern, structure or topology that emphasises organisation based around interconnections between nodes (Castells, 1996; Gane and Beer, 2008: 20). They are circulatory because their structure emphasises social connections and relationships that are made through movements between nodes in the network, or what Castells (1999: 295; 2000a) describes as flows, with practical examples of networks being understood by virtue of what flows between different nodes, such as digital data. The interconnections between nodes are therefore "multiple, intersecting, and often redundant ... [and] evoke[s] the logic of decentralised, proliferating connectivity which defines the essence of a network" (Barney, 2004: 2). The importance of these flows is emphasised by Castells (1999; 2000a; 2000b), who argues that the economic, political and cultural spheres of a society have become restructured around networks, creating a "Network Society". One of the central catalysts for this are digital and informatics networks that are essential for creating, supporting and facilitating interactions within the Network Society (Castells, 2000c: 695), providing the flexibility and adaptability to allow network morphologies (Castells, 2000a)[29]. Network societies are fundamentally different because of the circulatory nature of flows, with constant movement and connection creating an entirely new kind of social space, what he calls "the space of flows". The organisation of society around networks means that social interactions are no longer governed by "spaces of place", where physical location and proximity define social space, and instead take place in an abstractive and hybrid space defined by flows[30].

[29] The specific list of developments identified by Castells (1996) includes the rapid developments in information technologies and data networks, developments in new civil and social movements (e.g. environmentalism and feminism) and the conflict between capitalism and statism/communism (Van Dijk, 1999).

[30] Flows are not intrinsically digital however, and can be any kind of exchange through the network, both material and immaterial. They reflect a society that is increasingly defined by the mobility of people, goods and

The circulation of digital flows and informatic traces is a unique contributor to the societies and social relationships within networked societies, and warrants close attention. The circulation of data, whether it is the creation of and reception for the individual user, or the dynamics of digital traces across society, are significant factors in the lived reality of networks. This makes it critical for considering the Informatic Person and The Informatic Context, with data bridging both individual lives and broader circumstances. This is illustrated by Jose Van Dijk (2012), who highlights how the attention to information and data are central to the transition away from pre-modern societies, into contemporary network societies. Without networks to circulate data, such transitions would not be possible. As Wellman (2002a; 2002b; Wellman et al., 2003b) and Rainie and Wellman (2012) also argue, by providing a means of easily circulating data and others flows, networks are also responsible for creating new kinds of sociality that leverage the greater availability and movement of data. They suggest that new social mindsets are formed as a result of networks and circulation (discussed in more detail later in this thesis), and that this new mindset is a direct product of informatic circumstances. Networks and digital information therefore represent important and potentially defining aspects of contemporary societies, with the circulation of data being a key component of the organisation of society and individual lives.

A second but no less important contribution is that ideas of circulation provide a means of conceptualising data and power. The circulation of data, and particularly the potential (im)mobility of data, is an increasingly important yet contested site in contemporary social and political orders. For example, Bauman argues that contemporary societies, what he calls liquid modern societies[31] (Bauman, 2000), feature a divergence in political power and politics, with political power now flowing through a globalised assemblage of actors that exist beyond individual nations, yet can easily

services (Larsen et al., 2006; Urry and Lash, 1994; Urry, 2007), just as much as they do digital traces and information.

[31] Liquid modernity is described by Bauman (2000; 2005; Bauman and Lyon, 2013) as a society where social forms rapidly and constantly change, with reduced stability and permanency for social and political institutions, and individual lives filled with new opportunity but constant uncertainty. Social relations are defined by increased scope for change, but also unprecedented uncertainty.

influence geographical states (Bauman and Lyon, 2013: 5 - 6). Power is held and moved in the flows and networks of society, and not held by any nation state. The language and concept of circulation is thus useful because its metaphors allow some of the power dynamics and relationships between data and society to be more fully considered[32]. Tensions in the network society are occurring not only at the network/node level, but also through the flows and exchanges of networks, particularly in those that are digital. The flows of networked, Informatic Contexts are a site of this tension. For example, databases have emerged as an instrument of power in the network society. Databases and data storage systems are vital infrastructures that support the transmission of data in networks. They are also sociologically significant through how they temporarily pool and control flows of digital information. Poster (1996) advances this argument, noting how databases gain power as they come to exclusively hold information. From these exclusive pools of data further power comes, as the decision to withhold or release data to circulation becomes a defining factor in society.

If data have the power to define, create, identify and otherwise make up the individual (Hacking, 1986), the ability to order circulation is also very important. For example, Lyon (2002; 2006) notes how databases are a fundamental site for social sorting and surveillance as they provide a frame of reference for categorising and sorting individuals in a differential matter, a digital tool for identifying those deemed to need special (often punitive) treatment. An everyday practice for an Informatic Person, such as travelling to another country, is informatically mediated as a person's identity and security status are determined. As Aas (2011) identifies, at least seven major databases are in use in border control in Europe, holding information from police dossiers to biometric records on every traveller. By acting as an exclusive pool for informatic traces and digital flows, databases have the potential to drastically influence the lives of Informatic Persons based upon the data they create in everyday life. By restricting circulation they become what Lash (2002) describes as foundational tool

[32] For more on this see Castells (2011a), who provides detailed discussion on potential forms of power, counterpower and resistance in the context of network societies.

in new regimes of inequality that are based on excluding or limiting the mobility and access of individuals and groups, over-exploiting their existence. A recent example of this can be seen in the Australian Government's attempts at creating a metadata retention scheme (Attorney-Generals Departments, 2016), an exclusive pool of data for use in security and policing. Attempts to control the circulation of data are examples of contemporary instruments of governance and power that have significant potentials for the Informatic Context, and Informatic Persons. This makes their consideration important to understanding the position of Informatic Persons and today's mediated relationships.

The significance of informatically mediated relationships and power is further emphasised by concerns around how data are blocked and filtered. It is not only the (im)mobility of data that is important in circulation, but how it is filtered or limited. Flows of data and digital traces may be differentially provided to create new kinds of power dynamics that are exclusive to Informatic Contexts. Access to circulation (DiMaggio and Hargittai, 2001; van Dijk, 2006) and the ability to use informatic technologies (DiMaggio et al., 2004b; Hargittai, 2001; Hargittai and Walejko, 2008; Hargittai, 2010; Zillien and Hargittai, 2009) is not evenly spread, with differences providing ground for inequalities that are defined by limits to circulation (as discussed in Chapter Two in relation to digital divides). A unique and informatically exclusive variation on this inequality is found in a so-called "third-level divide", where inequalities are appearing between those who have access to data and those who are blocked from this. This has been described by Andrejevic (2014) as a "Big Data Divide" because the inequality stems from how data that are restricted from individuals can be used to analyse them without their consent. The rise of privately held databases, where access is not so much differential but entirely restricted, is a growing concern for society (boyd and Crawford, 2012; Graham, 2004). Furthermore, those who have the ability to control the networks and platforms of circulation may be better equipped to filter and restrict the flows within the Informatic Context. Due to the volumes of information present in everyday life, many processes of filtering occur as a part of

everyday digital conduct[33]. This capacity to mediate the circulation of information can however be used to unfairly advantage or disadvantage different populations. This results in "filter bubbles" (Liao and Fu, 2013; Pariser, 2011), where the presentation of informatic spaces, and the possible choices of the online environment, are limited or restricted. Censorship is also routine in some countries (Electronic Frontiers Australia, 2002; Howard et al., 2011), with greater computing and algorithmic power used by authorities to restrict or edit the flows of data available to populations.

Networks and power relationships are a unique aspect of the Informatic Context, contingent upon the socio-technical systems of circulation, yet enormously present in society. This makes considering circulation an important part of the Informatic Context. While interfaces may connect Informatic Persons to a context of data, this is only meaningful by considering the (im)mobility of data. Circulation reveals the complicated dynamics that mediate and facilitate informatic systems, and therefore also the relationships present in the Informatic Context. The sociality of Informatic Persons is therefore contingent on circulatory factors, and vital to the analysis. As raised in discussion on the dimension of power at stake with circulation, the movement of data is often tied with what is done with data, what might be referred to as data abstraction. While circulation is distinct from this, the line between these two dynamics of data is often blurred and with considerable crossover.

## Abstraction

Abstraction refers to the growing arrays of data manipulation techniques being applied in digital societies. Whereas interfaces provide the digital link for individuals and groups, and circulation concerns the dynamics of how this captures digital information flows, abstraction focuses on how data are being used in society. Practices considered here include, but are not limited to, trends such

[33] For example, social media (Carah, 2015; Carah and Shaul, 2016; Pariser, 2011) and popular shopping sites like Amazon (Linden et al., 2003) and eBay (Dellarocas, 2001) are mediated depending on the preferences of users, as determined by an algorithm. The data received and accessible to an Informatic Person is mediated, under the logic that a more tailored experience will be beneficial to a user.

as Big Data, quantified self and self-tracking movements, and the application of algorithms and related mathematical and statistical techniques with regard to data[34]. For Informatic Persons, abstraction represents a powerful new layer to the informatic strata of society, acting as the *raison d'être* for other aspects in the Informatic Context. Data have a value and purpose in society, with interfaces and circulation providing the means of capturing and spreading digital identifiers. Discussion on interfaces (particularly logjects) has revealed how ordinary household items are increasingly reliant on data processes and networking, and that examples of circulation (such as databases) exist because of the power data has when combined with analytical functions. Abstraction is therefore an integral element in the operation of the Informatic Context, and an important variable in the relationships Informatic Persons have.

The significance of data abstraction lies in the powerful, yet highly problematic, epistemology formed around data, and how this epistemology is applied in the Informatic Context. Data-abstraction processes, such as Big Data, place data above all else in understanding and enacting society, rejecting alternative epistemology stances in favour of insights gained through quantifiable data. Jose Van Dijck (2014) describes this paradigm as that of dataism, an empirically driven and positivistic account of the world characterised by "a widespread belief in the objective quantification and potential tracking of all kinds of human behaviour and sociality through online media technologies" (van Dijck, 2014: 198). She argues that the potential of what Mayer-Schoenberger and Cukier (2013) call datafication, or the conversion of all social action into recordable digital traces, is the (unfounded) belief that data traces are the "gold standard of knowledge about human

[34] Discussion on abstraction does not seek to drill down into any one specific technique, nor is it desirable to do so. Instead, abstraction refers to the assemblages of socio-technical and informatic concerns that focus on manipulating and working on data with some intent, rather than any one specific technique or approach. As boyd and Crawford (2012) point out, approaches to data manipulation are of themselves not pure entities, with their discussion on Big Data revealing that this phenomenon is not a unified ideal type, but a melange of technological systems, analytical techniques and mythologies and discursive claims about the approach. It is more appropriate, therefore, to explore the trend of data abstraction at this stage rather than the specific technique, while acknowledging the potential unique contributions of each practice.

behaviour" (Mayer-Schonberger and Cukier, 2013: 201) when combined with appropriate analytical techniques[35]. This belief has developed considerable traction in popular culture, as Chris Anderson's (2008) proclamation of the "end of theory" and the rise of the "petabyte age" in *Wired*, argues:

> massive amounts of data and applied mathematics replace every other tool that might be brought to bear. Out with every theory of human behaviour, from linguistics to sociology. Forget taxonomy, ontology, and psychology. Who knows why people do what they do? The point is they do it, and we can track and measure it with unprecedented fidelity. With enough data, the numbers speak for themselves (Anderson, 2008).

When coupled with datafication (achieved via interfaces), and a large enough volume of data (through circulation practices), data-abstraction techniques provide a form of knowing that is superior, and different, to other kinds of knowing (Lohr, 2015: 3). This superiority, indicated by Anderson (2008) as the "end of theory", lies with the ability of data-abstraction techniques to better predict social outcomes without necessarily understanding them. The argument is that it is enough to know something happens, and that something may happen in the future, rather than to know why this something happens (Leonelli, 2014). As Andrejevic (2013) and Savage and Burrows (2007; 2009) both suggest[36], data-intensive approaches sidestep the complexities and shortcomings of

[35] According to Kitchin (2014b: 129) another example of this is Jim Gray's (2009) concept of fourth-paradigm science, which argues that society is on the cusp of new forms of science and scientific knowing, driven by data-intensive instruments, abstractive analysis and software forms, that seek to "objectify knowledge" (Gray, 2009: xxix).

[36] Andrejevic's (2013) argument is that these new epistemologies are a response to the oversaturation of information in society, which has contributed to what he describes as a decline in symbolic efficiency. Taken from Zizek (1999), symbolic efficiency is the relationship between objects and their meanings, and the ability of this relationship to describe reality. The competing (and often contradictory) claims about causality in society, and the inadequacy of existing epistemological and social positions to provide answers to societies, have contributed to the decline in symbolic efficiency. It is unclear whether an object (such as the news media) accurately portrays a truthful and accurate meaning (the news story in question). Data-intensive approaches are perceived as a means of sidestepping these problems, avoiding knowing about why things happen, in

finding causal answers through theory or non-qualitative approaches in favour of predicting potential outcomes. These ideas provide the basis for a persistent view, both popular and academic, that the development and implementation of such a data-driven society is a social good. Post-causal, post-referential modes of a knowing and doing society are viewed as being more accurate, trustworthy and productive than non-data methods (boyd and Crawford, 2012), and that the datafication of societies, down to the details of everyday life**,** would be helpful and desirable for societies and individuals (Mayer-Schonberger and Cukier, 2013). Interfaces and circulation therefore contribute to creating conditions within the Informatic Context that align with those related to data abstraction, and form the basis of how Informatic Persons are treated by entities within the Informatic Context.

Data analysis and abstraction practices hold a prominent place in the Informatic Context and in the lives of Informatic Persons. Adopted in many aspects of the digital society, data-abstraction practices change the nature of relationships that Informatic Persons have to the institutions and organisations that adopt them. For example, Harpur and Burdon (2014) indicate the potential for "info-structural determinism", where individuals are systematically disadvantaged in social environments where data-abstraction techniques are used. They use the example of "talent analytics" in recruitment to illustrate how discriminatory practices can be built into the algorithms that manage recruitment and human resources. While powerful in hiring and retaining high-performing staff, they also create a system that judges people based on informational attributes (i.e. their digital and informatic traces). Thus any informatic traces, whether intentional or unconscious, can potentially serve to judge and dictate the future opportunities of an individual. This is a particularly important element for Informatic Persons, as interfaces capture more data and circulation practices share these data more

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favour of predicting it in future. Savage and Burrows (2007; 2009) on the other hand frame this effect in terms of the impact on sociology as a discipline, and warn of a crisis for empirical sociology if these new approaches are not engaged with.

easily. Everyday digital conduct and practice can be used to judge and vary relationships within the Informatic Contexts, thanks to the power of data-abstraction techniques.

Discussion on surveillance further highlights this, as Informatic Persons are connected into relationships with surveillance entities using data abstraction through the Informatic Context. Disclosures made by Edward Snowden and Julian Assange/WikiLeaks have in recent years highlighted the existence of an enormous surveillance apparatus operated primarily by the United State's NSA, with collusion from both private companies and allied nations, including Australia (Greenwald, 2014; Guardian, 2013). These enterprises have come to reflect the logic of datafication in that they have transitioned away from systematic and targeted attention to detail of a few guilty parties, and instead undertake what Clarke (1988; 1994) calls dataveillance. This is described by Clarke as a large-scale, statistically based, drag-net surveillance, embracing a "collect it all" logic facilitated through data circulation and interfaces that provide and share data. These are used create "determinations of risk and suspicion result[ing] from complex data interactions that are both unanticipatable and inexplicable. The database can generate patterns that have predictive power but not necessarily explanatory power" (Andrejevic and Gates, 2014: 186). As Lyon (2014) describes, surveillance in an Informatic Context is more anticipatory, autonomous and adaptive through the use of data abstraction. These systems are invisible, and present little opportunity for an Informatic Person to engage with the evaluations occurring. This is despite all data being relevant and useful for these systems. As Lyon (2014: 3) later states:

> What users unknowingly disclose on those [ social media] platforms – such as Facebook or Twitter – or when using their phones, is usable data for "national security" and policing purposes. But more importantly from a Big Data perspective, metadata [...] relating to users is gleaned without their knowledge from the simple use of these machines (Lyon, 2014: 3).

The perceived accuracy and infallibility of data-abstraction techniques has placed it as a desirable and superior way of enacting society to many organisations' bodies. It leverages mass datafication through interfaces, and easy circulation of data, to create circumstances for Informatic Persons determined by their informatic traces, but often without their awareness. Every recordable action within an Informatic Context places an Informatic Person in a relationship with these techniques and practices, potentially formatting the interaction between Informatic Persons and entities within the Informatic Context.

The logic behind these relationships is potentially problematic, with data-driven epistemologies ignoring the limitations of data, and potentially misrepresenting society. The objectivity of data abstraction relies on exhaustive data collection, something that Kitchin (2014b: 155) points out is often impossible. The *n=all* narrative of Big Data and other practices is often fallacious, and achieving what Latour (2005) describes as an oligoptic view, a way of knowing that favours certain tools and spaces of knowing, without capturing all possible views. Data, and data-abstraction techniques are also not asocial, and are contextually situated. For example, data collected in dataveillance regimes conducted by the National Security Agency (NSA) in the United States occurred in partnership with private corporations like Facebook (Bennett et al., 2014; Greenwald, 2014). Thus the "objective" data created from the analysis run was only objective insofar as Facebook's data were. As documented elsewhere the personal information that Facebook collects is entirely aligned towards economic rationales, and not objective (Trottier, 2012). Thus the predictive capacity and privileged form of knowing created were no less social and no more objective than previous means. These data must also require the work of fallible, biased and situated human beings to be interpreted (boyd and Crawford, 2012). Thus data are never without bias, and algorithms and interpretations are not agnostic (Crawford, 2016), producing clear winners and losers in the socio-technical spaces and situations to which they are introduced. Data abstraction is therefore a problematic yet powerful modifier in the Informatic Context. It occupies a powerful position discursively and practically in how

data are enacted in society, yet is also fraught with complications that influence the nature of the Informatic Context. Informatic Persons must negotiate their relationship to data, and to these abstractive practices, as a part of living in the Informatic Context

While the above discussion has focused on broader trends around data, data manipulation practices are embedded at the everyday level, and often featured in the interfaces of the Informatic Context. As the above consideration of interfaces reveals, many digital devices are reliant on software, assemblages of digitally coded artefacts, environments and languages that allow a device to function (Berry, 2011; Fuller, 2008; Mackenzie and Vurdubakis, 2011). Data abstraction is inherent to software as software acts and works with data within a system to perform and create a function (Mackenzie, 2005; Mackenzie and Vurdubakis, 2011). Software is thus about the manipulation of data, with everyday life filled with powerful yet often invisible forms of data abstraction. As Manovich states, it is "a layer that permeates all areas of contemporary society" (Manovich, 2013: 8), featuring in interfaces (particularly logjects) and in the plethora of computerised systems present in society. Software acts as another potential modifier for the relationships that Informatic Persons must negotiate, affording certain kinds of relationships with informatic systems. As Mackenzie (2006; 2013) explores, expectations and norms can be coded into software, influencing how these software mediate the lives of users. These potentials are not inherently negative, with enormous potential for software to contribute to social issues such as public disaster relief and organisation (Adam et al., 2012), or public health issues (Lupton, 2013; 2015b), through the lens of software. As discussed in Chapter Two, the rise of personal digital assistants and applications on mobile interface devices also signals a means by which software is more visibly contributing to the Informatic Context. Software is a subtle, but not less important, example of how data abstraction features in the Informatic Context and modifies the Informatic Person's relationships. While not as prominent as Big Data or other macro-social trends, it actively manipulates data within the Informatic Context, and demonstrates how abstraction integrates into all levels of the Informatic Context.

Data-abstraction practices, like the interfaces and circulatory practices discussed above, are a mediator in the Informatic Context. They contribute and modify the connections and relationships that link and pass through it. Data abstraction can significantly influence relationships within Informatic Contexts, being a powerful new tool for achieving socio-technical ends, while also being highly problematic. Every informatic trace and activity in the Informatic Context potentially links to an example of abstraction, and influences the relationships Informatic Persons must negotiate. While the complications of data abstraction have been emphasised in order to justify their significance to informatic life, it is important not to downplay the potential positive contributions of these systems. The ability to analyse and abstract large volumes of data has been identified by the healthcare sector as potentially providing many positive contributions to medicine (Murdoch and Detsky, 2013), and will likely provide large benefit for business (Bollier, 2010) and media (Manovich, 2012)[37]. What is still required, however, is a critical perspective on the impact of data analysis in its many forms, as although these systems may seem distant, they are connected to the everyday practices and conduct of Informatic Persons through their data, and are unlikely to fade anytime soon.

## Informatic Personhood and Informatic Persons

The people who live within the Informatic Context are referred to as Informatic Persons, with their specific mindset and state of being described as Informatic Personhood. The Informatic Context seeks to map the relevant socio-technical and digital phenomena occurring in society, and provide a topography for the relationships and entities that must be negotiated as a consequence of technology. Informatic Persons are those who do the negotiating, the individual persons living within this context, whose lives are intersected by any number of socio-technical relationships. In understanding the relationship between these two concepts, the Informatic Context can be thought of as the socio-technical stage, and the Informatic Person as the actor(s) on this stage. The

[37] This is discussed in more detail in Chapter Two, in Sections Two and Three on circulation and abstraction.

Informatic Context furnishes the background infrastructure, props, and pre-existing relationships for an Informatic Person. Understanding this stage and its various relationships (human, nonhuman, or combinations of), is the domain of the Informatic Person. In the process of responding to this stage and its relationships, unique mindsets and experiences are developed. These concepts blur into each other, and are not deterministic. The actions of the Informatic Person can change the stage the Informatic Context sets, just as the infrastructure in the Informatic Context can influence the relationships of the Informatic Person. The metaphor of the stage has limits however, as central to these relationships are data, which create many of the relationships and bind the two ideas together. Data are the omnipresent building blocks of the stage, and relationships between actors. Exploring these relationships is the focus of this thesis, and the Informatic Person is the unit of analysis.

As stated earlier, the idea of Informatic Persons/Informatic Personhood is not a theory of identity, ontology or any grand narrative about human subjects and technology. It is a heuristic device for considering how people and everyday life are enacted in the Informatic Context of data and data technologies. It is an idea for capturing relevant socio-technical relationships, practices and experiences occurring within the Informatic Context. An individual does not necessarily have to explicitly state their belief that they are an Informatic Person to be understood as such. What is common is that individual persons, through choice or happenstance, live in the presence of technologies and data, specifically those identified in the Informatic Context. It is not assumed that all people live within Informatic Contexts, or are Informatic Persons. Economic, cultural, geographic and demographic circumstances can all vary exposure to Informatic Contexts. However, where there is exposure to data and data technologies as described in the Informatic Context, then Informatic Persons are found[38].

[38] For example, while developed, advanced and post-industrial nations are the most obvious site for the Informatic Context and Informatic Persons, many intersections with developing and less affluent nations are

The language of personhood is used to focus on the situated, lived experiences of technology and data, and on the numerous intersections and relationships that occur as a result of technologies' presence in society. The Informatic Context describes a landscape, but it is Informatic Persons who must experience and live within this. Informatic Personhood seeks to interrogate the negotiations and relationships forming in this context. These negotiations and relationships are demonstrated in contextually situated beliefs, practices, actions, concerns, ideas and emotions concerning informatic technology. They are the reflections that people within Informatic Contexts have of the broader socio-technical world.

The idea of Informatic Personhood is inspired by what French (2014) describes as "informatic practice". In his analysis of the Canadian healthcare system, French emphasises the importance of considering examples of "informatics practice", or "the sum of everyday activity, by assemblages of humans and non-humans, that makes information a material reality in quotidian life" (French, 2014: 227). Socio-technical contexts, like the Canadian healthcare system and its Big Data system (the Integrated Public Health Information System — iPHIS), do not occur or work without many independent forms of social practice and activity towards data and information technologies. Whether this is data entry into a console, or the maintenance of the network by technicians, the enactment of data contexts cannot occur without activity. This activity does not exist in a one-dimensional or uniform way, or with a constant and predictable effect. Instead, informatics practice represents contextual acts concerning data that can significantly vary the overall performance of the system. French's observations point to the importance of understanding the situated nature of technology and data systems, and understanding the relationships and work of agents within socio-

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possible. While digital infrastructure in these countries may be lacking, mobile devices do have a presence in developing nations (Poushter et al., 2015; The International Telecomunication Union, 2016) and have the potential to connect a user to an Informatic Context. In the case of surveillance for example, all that is needed to actively monitor an individual is a phone number (Gibbs, 2016), with information gained from this number joining the broader assemblage of circulatory and abstractive processes. Thus while data-intensive devices may be a fixture in the affluent west (and east), there is sufficient penetration of technology for Informatic Contexts and Informatic Persons in a variety of locales.

technical contexts. The idea of Informatic Person(hood) therefore seeks to continue this line of inquiry on the situated data and technology practices of persons within the Informatic Contexts.

## Conclusion

To live in contemporary society is to find oneself in a complicated, messy assemblage of digital and socio-technical changes that have enormous impact on everyday life. This thesis seeks to probe this assemblage, and the relationships created within it. The ideas of Informatic Person(hood) and the Informatic Context are given as heuristics for capturing the socio-technical and sociological topography around data and data technology. As has been argued in this chapter, they provide helpful means of understanding the context of data in which modern persons live, and the significant links that this context has to broader issues. The three pillars of the Informatic Context, data interfaces, data circulation and data abstraction, have provided flexible signposts for considering the many different sites and connections that digital societies have. Whether this is through the continuing spread of digital interfaces into everyday social practices, or the issues of power that mass data circulation brings, or the surveillance potentials of data abstraction, these socio-technical trends have clear and significant impacts on the individuals living with the Informatic Context. Informatic Persons are those people living within this context, and it is their situated experiences and relationships that this thesis seeks to explore.

# Chapter 4 — Methodological Framework

## Introduction

Informatic technologies, digital networks and socio-technical relationships are complex and multifaceted sociological phenomena, requiring a methodological approach that actively engages with this heterogeneity. As Dourish and Bell (2011b: 4) state, "the practice of any technology in the world is never quite as simple, straightforward or idealized as it is imagined to be ... [a] mess is never too far away". Studying the Informatic Context potentially concerns a diverse range of actors (human and nonhuman) and requires a framework that can capture the nuances of interfaces, circulation and abstraction. This includes the roles of data and code (Busch, 2011; Walsham, 1997) and digital network infrastructure (Bowker and Star, 1999; Star, 2002) as well as their associated social contexts (Haddon, 2006; Kling et al., 2005; Silverstone and Haddon, 1996). Data technologies also raise ontological concerns (Dourish and Bell, 2011b: 5; Latour, 1993; Pickering, 2010) given the prominence of the nonhuman. The study of the Informatic Context and the relationships of an Informatic Person therefore requires a means of capturing and understanding these heterogeneous social circumstances.

This chapter presents the methodological framing of the research, and the method used to collect data. The methodological framework adopted here is that of Irwin and Michael's (2003) Ethno-Epistemic Assemblage(s), henceforth referred to as EEA(s). This approach has been previously employed to study complex socio-technical phenomena such as nanotechnology and bio-technology (Felt and Fochler, 2008; Felt et al., 2013; Scott and Du Plessis, 2008), xenotransplantation (Cook, 2006; Michael and Brown, 2005) and the relationship between the public and techno-scientific institutions (Allgaier, 2012; Horst, 2007; Michael, 2009). While this approach has primarily been used in the social studies and public understanding of science, this approach provides an excellent toolkit for exploring complex socio-technical relationships, such as those in the Informatic Context. This

ability comes from the approach's unique capacity to provide tools that focus on heterogeneity and the socio-technical relationships (or relationality) between heterogeneous components (Lee, 2015). Heterogeneity is central to relationships formed in the Informatic Context, as the circumstances of the Informatic Person are born from intersections with different socio-technical systems, making EEAs a helpful approach to conceptualising this[39]. The details of the EEA are first explored in detail, with the methodological and ontological positions and implications discussed. After this, the practical details of the methodology, such as sampling and interviewing, are described in detail. Through the use of the EEA and appropriate qualitative methods, a practical approach for investigating the Informatic Context, and relationships of Informatic Persons, is provided.

## The Ethno-Epistemic Assemblage

The analytical frame adopted in this research is the ethno-epistemic assemblage (EEA), as developed by Irwin and Michael (2003). It is not applied strictly or prescriptively, but applied as a flexible conceptual frame for understanding socio-technical relationships, emphasising the blurriness and complexity of techno-science and society. In their own words, Irwin and Michael describe the EEA as:

> a heuristic: it is a tool with which to explore how such heterogeneous groupings might be characterized. Ethno-epistemic assemblages are meant to aid us in examining how such 'odd' mixtures come together, cohere and 'work' as, perhaps, unitary or singular actors (Irwin and Michael 2003: 113).

The EEA is not a specific method or methodology, but instead as a set of principles and sensitising concepts for facilitating the analysis of heterogeneous social phenomena. This approach comes from

[39] Although an *a priori* knowledge and recognition of circumstances of socio-technical heterogeneity (such as the Informatic Context) would provide a helpful example to understand how EEAs might be used, the application of EEAs are not contingent upon this. EEAs are heuristics and toolkits for exploring heterogeneity, with the practical or conceptual use of EEAs not reliant on *a priori* knowledge of the topic (although potentially beneficial, as the EEA's emphasis on flexibility can be confusing without an example to use). With thanks to Reviewer Two for identifying this confusion.

the social studies of science, the Public Understanding of Science (PUS) and also science, technology and society studies (STS studies). EEAs seek to explore the relationship between techno-scientific institutions (and their associated expert knowledge) and the broader public, a relationship Irwin and Michael (2003) identify as being tense and combative. They highlight the disjunction between the public (individuals, communities and groups that are not experts) and views of authorities (experts, governments, institutions). PUS identifies this as the deficit model, where non-scientific actors and the knowledge they possess is viewed as inferior by scientific authorities (Irwin and Michael, 2003: 38)[40]. Despite the negativity towards the public, the deficit model of thinking has remained popular amongst governments and organisations and has only recently been challenged (Irwin and Michael, 2003: 62 - 3). These challenges have led Irwin and Michael to de-emphasise the capacity of any specific or singular theory or approach to techno-science and society. Instead they argue for "the exploration of blurring and mixing, [and that] these [ethno-epistemic] assemblages are a means of expanding the range of entities, actors, processes and relationships that get blurred and mixed up" (Irwin and Michael, 2003: 113 - 4) in contemporary, socio-technical society. Ethno-epistemic assemblages are therefore a means of understanding the "hybridization of heterogeneous resources, practices, things, techniques and sets of relations as differently located people engage with [techno]science" (Scott and Du Plessis, 2008: 106).

Ethno-epistemic assemblages represent a potent and appropriate means of exploring the relationships within the Informatic Context, and the experiences of Informatic Persons. This is demonstrated on multiple levels. Firstly, EEAs explicitly focus on heterogeneity at a practical and ontological level (discussed in more detail below), which helps understand the nature of informatic technologies in society. The Informatic Context is highly varied, with a diversity of different socio-technical systems implicated in each of the three pillars. All these have their own social and material networks and histories, and unique material properties that are relevant to social investigation

[40] For more on the deficit model see Irwin and Wynne (1996) and Sturgis and Allum (2004).

(Dourish and Bell, 2011b). For example the properties of digital code and data in circulation that are linked to these material nodes are also important, as they are intrinsic to their operation (Graham et al., 2013; Kitchin and Dodge, 2011). Additionally, there are competing social discourses around these technical developments. From digital citizens (Isin and Ruppert, 2015), to adherents of Networked Individualism (Rainie and Wellman, 2012; Wellman et al., 2003a), to members of the network society (Castells, 2011b; Stalder, 2006) and beings comprised of code and mathematical derivatives (Cheney-Lippold, 2011; Deleuze, 1992), many perspectives exist around how circulation (and interfaces and abstraction) are understood. Thus any perspective that allows a heterogeneity of views (individual, organisation, governmental for instance) and contributing components (human, nonhuman, discursive, digital and affective) to be analysed is of great value to informatic research.

Second to this point is that EEAs have demonstrated their usefulness in capturing this heterogeneity in a way that pays specific attention to the personal perspectives and relationships (that is, personhood) present around techno-science. Because of the focus on the tension between the public and institutions/experts, considerable parts of Irwin and Michael's (2003) thesis concern EEAs in relation to what has been referred to as scientific citizenship (Brossard et al., 2005; Irwin, 1995; Kolstø, 2001), an approach towards science/society relationships that places scientists in a two-way, democratic dialogue with the public (Bickerstaff et al., 2010: 478). EEAs are therefore useful in exploring multifaceted issues where there is a personal relationship present. This is reflected in the use of EEAs as a part of other research projects. EEAs have been used to explore the perspectives on techno-scientific endeavours like genetic engineering (Horst, 2007) and bio-technologies (Scott and Du Plessis, 2008). In these examples, the personhood of participants (their personal beliefs, experiences, relationships, responsibilities) are linked to broader social and scientific debates, with the dynamics between these explored. Ethno-epistemic assemblages therefore provide useful tools for exploring how the dynamics of the Informatic Context are translated across into meaningful social relationships for Informatic Persons.

The specific methodological details and contribution of the EEA approach is best understood through discussing its constituent elements, with each element providing valuable tools in the study of socio-technical patterns like the informatic.

**Assemblages**

Irwin and Michael (2003) draw upon Deleuze and Guatarri's concept of the assemblage as the primary structural metaphor for EEAs. According to Deleuze and Guattari (1988), assemblages are fluid networks of heterogeneous objects and associations. They are described as "rhizomatic", possessing no inherent structure or direction but instead being like a system of roots, expanding independently of each other but still holding some relation (Haggerty and Ericson, 2000). The notion of the assemblage is closely associated with Deleuze and Guaratti's psycho-analytical philosophy. They argue that the essence and direction of people and society, what they call desire, is not of *being* but *becoming*, of infinite possibilities and directions (Carter and Jackson, 2004: 108), which ultimately reflects achieving and constantly becoming something rather than preserving or achieving a fixed state. They refer to this as immanence (Harrison, 2000). Assemblages are a product of this immanence, a metaphor used to capture the kinds of organisations within the context of multiplicity, being temporarily bound spaces of association. They can be composed of anything and any relationship(s), with no commonalities necessary except that the elements act to (temporarily) satisfy a desire. As a reflection of Deleuze and Guattari's belief in immanence, assemblages are never stable or permanent and possess infinite "lines of flight" (May, 2005: 158), being the possible directions in which they may change and develop. Assemblages are therefore in constant motion, in processes of territorialisation and deterritorialisation, the dynamics of forming temporary groups (territories) that break up (deterritorialisation), progress and reform (reterritorialise). Understanding the relationships and movements of the various interests within an assemblage is important because assemblages themselves have no intrinsic meaning, and are instead defined through their relationships to other assemblages (Deleuze and Guattari, 1988: 4). This is indicated through Deleuze

and Guarrati's references to the "machinic" or heterogeneous components of an assemblage, and the "enunciatory" or the communications and statements made between different elements inside and outside of the assemblage. While Deleuze and Guatarri's philosophical position is complex and highly detailed, the value and importance of the assemblage metaphor is simple: it provides a means of capturing and understanding multiplicity and any associated relationships that are present in social reality.

**Ontological Implications and Justifications of Assemblages**

As described above, assemblages are highly beneficial for studying the Informatic Context given the heterogeneous composition of this space and relationships created within it. As Bijker (1997) describes, technologies represent a "socio-technical ensemble" of varied social interactions around technology. This ensemble includes the technological object itself, but also the diversity of possible infrastructure, other devices and social organisations that relate to that technology (see Dourish and Bell 2011b). EEAs understand this diversity with the assemblage metaphor. Furthermore, assemblages offer a flexible means of understanding technologies' place in society. The heterogeneity of technology has led to several different accounts of its relationship to society. For example, thinkers within the Social Construction of Technology or SCOT paradigm (Bijker and Law, 1992; Bijker, 1997; Bijker, 2009; Bijker, 2010; Pinch, 2009; Pinch and Bijker, 1984; Rosen, 1993) have argued that it is the social relationships, human histories and social judgments that define a technology. Technology possesses no special position in social life, being a consequence and product of human intention. As Klein and Kleinman (2002: 29) describe, SCOT "suggests that technolog[ical] design is an open process that can produce different outcomes depending on the social circumstances of development". Other perspectives have emphasised the importance of capturing the role and potential agency of nonhuman things, materials and phenomena in the analysis. Actor Network Theory (ANT) in particular argues for a principle of general symmetry (Law, 1992), where human and nonhuman actants/actors are considered as equal contributors to the (dis)ordering of

reality. This gives equal consideration to humans and nonhumans. This has caused some to malign ANT, suggesting it attributes agency to nonhumans (Bloor, 1999; Whittle and Spicer, 2008; Winner, 1993). ANT acknowledges the contributions of nonhumans to human society, but this is not the same as human agency (Latour, 2005; Murdoch, 1998). While SCOT and ANT present different takes on technology and society, they are also similar, both suggesting varying degrees of heterogeneity as intrinsic to society. The data technologies of the Informatic Context have many different relationships (human and otherwise) and presentations in society, and thus require an approach that accepts this.

Given the importance of heterogeneity, this thesis adopts a constructivist approach to technology, situating itself in what Jasanoff (2004) describes as an "idiom of co-production". This is a broad perspective of social and technological relations that emphasises the importance of each in co-producing the other. The idiom is left intentionally open to encompass the variety of perspectives surrounding information technologies. Assemblages lend themselves well to this openness, placing no rules upon the components that may come to constitute social reality, instead focusing on the relationships between them. The ontological position adopted here therefore reflects the position of ANT more than SCOT, emphasising the importance of the nonhuman in how reality is constructed. Nonhumans do not necessarily have agency, but they do actively contribute to society in a way similar to the affordance approach (Gibson, 1986; Hutchby, 2001). Coming from ecological psychology, affordance theory suggests that the physical nature of objects (nonhumans such as the environment) encourage or discourage an activity based on the materiality of the nonhumans in question (what is referred to as action potentials). Some suggest that this view places materiality as a "first causer" (Bloomfield et al., 2010) by suggesting that nonhumans and materialities convey possible intensions. This places agency outside of the subject (Gaver, 1991: 80), presenting a similar problem to that of ANT. However, Gibson describes any affordance as contingent upon the cognition and perception of the subject in question, which Michaels (2000:112) interprets as placing

materialities as co-present alongside social and cultural narratives in the composition of reality. Michaels demonstrates this through an example of how his walking boots afford and mediate his experience of nature. Their materiality provides him with the potential actions to experience and enjoy nature. This matches the assemblage perspective, and its focus on constantly changing elements and relationships[41], through which reality is created.

**Ethno-episteme**

A distinct part of the EEA and its approach to techno-science is the focus on the ethno-episteme(s). "Ethno" in the simplest sense refers to the situated and contextual nature of knowledge and experience (Haraway, 1988). It also emphasises reflexivity, or how "social activity can, in principle, be redefined moment to moment" (Irwin and Michael, 2003: 119). "Epistemic" refers to knowledge, or more precisely truth, and how truth is produced, distributed and maintained (Irwin and Michael, 2003: 119). As Foucault (1980) emphasised there are many discursive measures adopted in the manufacturing, usage and control (Hall, 2001) which acts as a form of power. Together, ethno-epistemes represent the situated knowledge claims and understanding that individuals, organisations and groups have of the world around them (their assemblage). In this way they are similar to the notion of "desire" that Deleuze and Guattari (1988) suggest as the motivation for the formation of assemblages. However, ethno-epistemes are more focused towards engaging empirically with specific contexts than the more general notion of desire. For example, in their study of individual and cultural beliefs around genetic illness, Scott and Du Plessis (2008) note how individuals and groups create different meanings of medicine based upon local factors and prior experiences. Similar scenarios are noted by Allgaier (2012) in the policy discourse around creationism and science in British schools, Horst's (2007) analysis of science professionals and the future of their work, and Blok (2011) on the politics of whaling. In each instance, ranges of discursive

[41] Deleuze and Guatarri (1988) describe this in terms of "infinite lines of flight", a phrase that reflects the possibility of an assemblage to expand and change (re/de-territorialise) in an infinite manner, forming any number of new associations and relationships.

and material elements are marshalled together (creating an assemblage) to understand the realities of the topic (episteme) based upon local and experiential factors (ethno). Ethno-epistemes do not have to exist in any real or verifiable sense, they are real in that they contribute to the presentation of reality for the individual or group in question.

A consideration of ethno-epistemic elements is a helpful tool in the study of the Informatic Context in two ways. Firstly, by considering all viewpoints as EEAs, a diversity of relationships can be considered with equal analytical weight and without individual or structural bias. Secondly, the focus on knowledge and truth claims[42] helps conceptualise the role of digital and informatic traces in the analysis. One of the original intentions of EEAs was to provide an analytical frame that allowed different views, which were typically hierarchal and opposing, to be explored on equal analytical footing. In Irwin and Michael's own words they aimed with the EEA to:

> study empirically and intervene in [techno]science-society relations. The notion of ethno-epistemic assemblages is, we suggest, a heuristic means of addressing science-society relationships in *any* context [original emphasis] ... rather than dealing with old rigidities, our attention is drawn to the manner in which many natures and many societies are being co-constructed (Irwin and Michael, 2003: 17).

The "old rigidities" referred to are the traditional hierarchies between scientific experts and institutional knowledge claims, and situated accounts of techno-science (see Michael, 2002; Sturgis and Allum, 2004). By appraising all positions on techno-science, whether they are local, global, individual or organisational, EEAs give attention without bias to any perspective. This is helpful in studying the Informatic Context, as just as techno-science is woven through everyday life and at all levels of society, so are informatic and digital systems. The study of the internet for example, can just as easily concern how individual users manage their digital identities (boyd, 2014; Robards,

[42] By truth claims, I mean the discursive statements made by participants to make sense of the world. Effectively, what participant's say about the world, and how they understand it, as captured in interviews.

2014) and how they live online through digital media (Hargittai and Litt, 2011; Marwick, 2011) as it can with meta-debates around privacy (Nissenbaum, 2009) and surveillance (Bennett et al., 2014). These views are interlinking but exist at different social levels, and by considering these different aspects as relatable EEAs, rigidities and hierarchies are avoided as all perspectives of reality are considered valid and comparable.[43]

Secondly the focus on epistemic movements and the truth claims provides an angle for considering digital traces and the various flows of informatic networks in the analysis. As discussed earlier regarding circulation and abstraction, one of the defining aspects of the Informatic Context is the contribution that digital services make to individuals' identities and the ways they understand the world. As Sauter (2013), Robards (2014) and others (Ellison et al., 2007; Hogan, 2010; Livingstone, 2008; Madden et al., 2007) have described, internet platforms such as social media provide a means by which identities and realities are built through digital traces. Profiles, logs, photographs and videos are all elements through which the self is revealed and performed online. These digital traces are increasingly being used in emerging methods in sociological research (McKie and Ryan, 2012; Ruppert et al., 2013) because of their richness and prominence in everyday life. This is not to reify the digital as a perfect method or indicator of social life. As Murthy (2008) indicates, there are many ambiguities and confusions around its use and meaning for sociological research. Instead, the intent here is to acknowledge that informatic traces are increasingly a means by which subjects are "made up" (Hacking, 1986) in modern society. With circulatory and abstractive practices so entwined in everyday relationships having an avenue by which these can be considered, like the EEA approach, is highly important.

[43] This is not to assume, however, that all relationships, actors or truth claims within an EEA are equal, fair and uniform. The study of data has revealed numerous inequalities and power imbalances in the relationships different actors have in networks (Castells, 2000a). Observing the exchanges (or lack thereof) between different actors and relationships, such as what Deleuze and Guattari (1988) called the enunciatory (what is shared between actors) and the machinic (relationship between actors), can be a helpful angle for this.

As noted throughout this thesis, this entwinement occurs on multiple levels. Digital traces flow into different contexts with ease and serve to create different conceptions of truth and meaning in doing so. Cheney-Lippold's (2011) concept of algorithmic identity is an excellent example, as the way individuals' metadata can come to define them within a system differs significantly to the definitions embodied individuals hold. Under the EEA framework, digital traces can be considered as contributing towards the ethno-episteme of individuals (and organisations). EEAs are interesting in the truth claims made around an assemblage, with the composition and nature of these claims being irrelevant. By being open to a plurality of claims, and focusing on the relationships in which an Informatic Person is situated, EEAs allow any material or nonmaterial aspect evoked by individuals (Informatic Persons for example) or organisations to be considered as a part of the analysis. This does not mean that the digital should be the only element considered, as the originally ethnographic background of the EEA was born of face-to-face efforts to engage non-institutional actors in science, particularly ethnographic and participatory methods. It means that this approach is open and embracing of heterogeneity of relationships that Informatic Persons draw upon in making meaning in the Informatic Context. This openness means digital traces might be considered, making it valuable to the study of the informatic.

This fluidity and flexibility of the EEA is both its greatest strength and value to informatic research, but can also be viewed as a significant problem. For example Chilvers and Evans (2009) have criticised EEA approaches as an attempt to understand complex networks through using complex philosophies and theories, but in an ambitious and confusing manner which provides few clear results. Through drawing on constructivist metaphors such as assemblages and networks, EEAs are also subject to criticism formed around these positions. Although most commonly applied to ANT, criticism that such constructivist methods are without rigour (Bloor, 1999), or feature an ontological and epistemological position that fails to reveal anything useful (Collins and Yearly, 1992), particularly around the role of nonhuman contributors (see page 73 of this thesis). However, while

there are similarities, it is important to note the distinctions between these criticisms and the purpose of EEAs. Unlike ANT, EEAs do not set out a philosophical program, or champion an original ontological cause. Instead the EEA is a purely pragmatic approach, a heuristic or tool designed to conceptualise heterogeneity in a techno-social situation. The perceived methodological weaknesses of the EEA can also be refuted through the examples of successful and productive analyses adopting this approach (see above on page 75 onwards). Not only can EEAs be applied successfully as the primary analytical framework, they can also provide concepts and ideas for managing heterogeneity in existing research methodologies. For example, Plesner (2011) suggests the EEA concepts might be used in qualitative interviews to consider the diversity of contexts that techno-scientific actors must manage.

To summarise, EEAs offer a flexible means of conceptualising the relationships that come from living in the Informatic Context. This flexible approach is defined by an acceptance of heterogeneous components (such as those implicated under the three pillars of the Informatic Context) and a focus on the relationships between these components in creating situated accounts of reality (as made by Informatic Persons for instance). It is important to note that within this thesis the EEA is not applied rigidly, or in a strict and prescriptive manner. The purpose of the EEA in this thesis is to provide concepts and ideas that are useful in charting the different aspects of informatic technology use and the heterogeneity of the Informatic Context. It is used to sensitise the overall qualitative methodology to the challenges and potentials of socio-technical topics, and to equip the research with the necessary tools to flexibly study the relationships of Informatic Persons and the various intersections of the Informatic Context. Given the heterogeneity of the Informatic Context and Informatic Persons, EEAs are a coherent way of capturing the multiple elements and beliefs raised in understanding these systems.

The application of the method/methodology to the concepts of the Informatic Person and the Informatic Context is done in a flexible manner. There is neither a focus on Informatic Persons or

the Informatic Context in the method or methodology of this thesis. Participants' statements are considered on an individual basis, with a focus on maintaining the authenticity of their voice in the analysis (as discussed below, the interview method and thematic analysis used here are particularly appropriate for this). Their discussion can both be understood as building the ethno-episteme of individual Informatic Persons, or the assemblage of the Informatic Context, depending on their particular narrative. These concepts are strongly related, but are not broken if used separately. For example, discussion with a "non"-Informatic Person maybe just as revealing on the infrastructures and systems of the Informatic Context, depending on their perspective. A "non"-Informatic Person may also have insights or points of comparison that help understand an Informatic Person. As with EEAs themselves, these concepts are used flexibly to grasp the heterogeneity of socio-technical trends present in everyday life.

## Methodology and Method

**Methodology:**

Given the focus on situated meanings and relationships of Informatic Persons, a qualitative methodology is adopted. This is logical and consistent with the EEA approach, supporting the investigation of situated meaning between disparate elements. According to Denzin and Lincoln (2005: 4-5), qualitative research is:

> a situated activity that locates the observed in the world. It consists of a set of interpretive, material practices that make the world visible ... [as] representations, including field notes, interviews, conversations ... [it] involves an interpretative, naturalistic approach to the world ... studying things in their natural settings, attempts to make sense of, or to interpret, phenomena in terms of the meanings people bring to them (Denzin and Lincoln, 2005: 4-5)

The focus of qualitative research is on meaning, and exploring experiential questions from the perspective of participants. This acknowledges the research as being interpretative, humanistic and a situated processes where the researcher is recognised as being a reflexive contributor (Creswell, 2003: 181 - 2). The researcher, and the data collected, are not objective representations of reality but co-constructions, with the researcher being aware of their position in creating the data (Ali et al., 2004: 24). This is coherent with the EEA's explicit focus on the "ethno-epistemic" aspects of social phenomena, an example of situated experiences and beliefs.

Instead of being a strict and ordered research processes, qualitative research is an open-ended research strategy for the exploration of experiential questions, influenced and utilised in a variety of ways depending on the theoretical and epistemological origins of the research (Bryman, 2012: 412). In this way, the qualitative researcher engages in bricolage, crafting a diverse set of theoretical and methodological tools for the purposes of answering the research questions. Denzin and Lincoln (2005: 5-6) describe qualitative research as "... a pieced together set of representations that are fitted to the specifics of a complex situation ... that changes and takes new forms as different tools, methods and techniques [are needed]". The focus on capturing multiple accounts and elements in research matches the idea of assemblages within the EEA, and the needs of the Informatic Context. Embracing, understanding and utilising heterogeneity is thus central within the methodological orientation of this thesis. This is also reflected in the overall perspective of the research, which draws up a variety of disciplinary positions, such as sociology, social informatic and surveillance studies. This acceptance of diversity is also consistent with the constructivist theoretical foundations described above, with reality understood to be co-constructed in nature (May, 2011: 16 - 7; Silverman, 2010: 226-9).

In keeping consistent with the logic of constructivist and qualitative research, semi-structured, in-depth interviews are used to collect data. Interviews allow a detailed discussion of the meanings, experiences, attitudes and values attached to objects (Brye, 2004; Jones, 2004: 258), and the

flexibility to explore new aspects of a topic as they develop in the research (Babbie, 2005: 315). This attention to detail, meaning and complexity makes in-depth interviews perfect for this research. Interviews allow practices and experiences that are directly unavailable to a researcher, such as beliefs around technology, to be explored (Daly et al., 1992). The focus on meaning also makes in-depth interviews more helpful than surveys or structured interviews (Liamputtong and Ezzy, 2005: 56) as the individual processes of meaning making can be explored in greater detail (Seidman, 1998: 3). Interviews match the social constructivist underpinnings of this research (Jones, 2004: 258) and reflect the need to engage with the situated experiences of participants. The process of interviewing is recognised as co-constructed, drawing on the interactions between participants and the interviewer (Holstein and Gubrium, 1997: 17). Co-construction recognises the subjective nature of interviews and interview data, providing a richer account of the actor *in situ* (Brye, 2004: 138; Minichiello et al., 1995: 12) while actively acknowledging and addressing the role of the interviewer in the reality of participants (Liamputtong and Ezzy, 2005: 57). While they are flexible, they are not completely conversational, being more focused and directive than unstructured interviews (Minichiello et al., 1995: 65). With the focus being on meanings and experiences of technology use, in-depth, semi-structured interviews are an appropriate and valuable method.

**Sampling**

Purposive sampling was employed to target affluent users of informatic technologies including, but not limited to, interface devices such as smartphones and tablets, and circulatory and abstractive services such as social media (and combinations thereof such as mobile media). This allowed targeted sampling of a specific section of a population based on the aims of the research (Tranter, 2009: 138), and whose characteristics are difficult to isolate but recognisable (Babbie, 2005: 207). It also allows the selection of participants who are unique and serve as rich sources of data (Neuman, 2011: 268). Snowball sampling was also employed, as any participants who joined the study were asked to recommend other individuals who meet the criteria to join the research. Purposive

sampling strategies include snowball sampling (Creswell, 2003: 119), and serve to complement the recruitment process by increasing participation rates (Hennik et al., 2011: 103). The study included a sample of 22 participants, consisting of 10 females and 12 males, between the ages of 18 and 69, from Northern Tasmania, Australia. While there is a possibility that this may have introduced an element of geographical bias to the research, this is not an issue as the purpose of this study is in-depth exploration of experience, and not generalisability (Liamputtong and Ezzy, 2005: 45). A full breakdown of participants' demographics can be found in Appendix One. Because a non-probability sampling method is employed, the study is not representative of the general population. However, as this research is qualitative in nature this is not the aim of the study. The sampling strategy provides a means of accessing rich sources of data and exploring depth of meaning, and is therefore appropriate under the qualitative paradigm (Liamputtong and Ezzy, 2005: 45).

Not only does this research target users of informatic technologies, it also focuses on affluent users. In this study, affluence is specifically defined as individuals with above average to high incomes, as determined by their annual disposable household incomes. The threshold for being above average is set at $100 000 AUD a year or greater. While the threshold for affluence may seem high, evidence suggests that the Australian middle class earns more than ever, and such a high figure is justified. For example Hamilton et al. (2007) suggest published Australian Bureau of Statistics (ABS) reports underestimate the disposable income for many Australians, with Hamilton et al.'s (2007) calculations presenting a significantly higher median income using unpublished ABS statistics. Based on 2005/2006 statistics, they explore the income of couples with children within their prime work age, or those aged between 25 and 45 years old, this being what they believe is the typical, yet undefined, understanding of Australia's middle class. Their analysis places median disposable income at $69 073, with an interquartile range of between $51 321 and $91 389. In comparison the ABS places median income at $48 193. More recent national data from Wilkins (2015) and the Household, Income and Labour Dynamics in Australian survey (HILDA) place the median disposable

income of their survey (ending in 2012) at $71 232, with a reported increase of $16 532 on 2001 numbers. Therefore, the threshold of affluence is not unreasonable, and is plausible for individuals with above average to high levels of income.

Income alone is one of the most commonly used demographic indicators adopted in the research. This is despite, however, recognising that income is a largely unsociological tool, especially for exploring social class. Whiteford et al. (2011) point out that a majority of studies that have sought to explore class, especially the middle class, use income as the sole measure of class, ignoring education and occupation, important sociological elements of class. This study does not include additional measures for two reasons. Firstly, this study is not directly about class. Its focus is on the state of living in the context of informatic and data technologies. As discussed above, targeting above average to wealthy income groups is informed by research indicating that they are a rich source of data, with a broad variety of behaviours towards technology, and a strong sense of engagement with the technology. Secondly, it comes from an appreciation of the demographic composition of Tasmania, Australia. Placing additional demographic variables on the sample may unintentionally exclude wealthy members of Tasmania's primary industry community, and the growing number of successful tradespeople in the labour market (Lewis and Corliss, 2012). As such, a focus on income alone is sufficient for the task of narrowing this study's sample. Nevertheless, the sample features 19 people with university qualifications, of which 17 have postgraduate qualifications.

Therefore affluence is used to select users with the greatest variety of experiences with data and data technology[44]. Research indicates that income levels, the primary means by which affluence is

[44] The association between affluence and variety of experience was done to ensure that an appropriate sample of users was found. This does not mean that experiences outside of affluent social circumstances are any less important or legitimate to understanding technology. This is clearly demonstrated by Goggin (2010) and Pearce (2013), who have explored the role of mobile media in the global south, identifying a diverse range of socio-technical behaviours in non-western, non-affluent locations. Affluence is only one potential mediator of technology, and its use here is for practical reasons. It should never be considered as a default, or standard

determined in this study, are related to greater access to informatic technologies and services, and also greater varieties of activity. DiMaggio et al. (2004a) argue that there is a broad association between socio-economic attainment and how effectively and productively information technology can be used, with affluence being linked to more effective and varied use. While critical of using income in measuring internet use[45], van Deursen and van Dijk (2014) find a significant relationship between pure income levels and how users manage data circulation on the internet. An extension of this is found by Brooks et al. (2011) who note an association between income and network size on social media sites, suggesting income affects the social relationships built with technology. Research on interfaces, such as smartphones and mobile technology, reveals that individuals and families with above average to high incomes display broader ranges of behaviour using mobile technology (Mackay, 2012), have a greater investment and interest in technology (Horrigan, 2009), and demonstrate a greater willingness and ability to integrate mobile technologies into their lives (Ames et al., 2011). They also display a greater acceptance of mobile technology and are more willing to generally incorporate such devices (Yardi and Bruckman, 2012). Conversely, individuals with lower incomes are less likely to access and own mobile and internet technologies, despite these services being personally important to them (Porter and Donthu, 2006; Smith, 2013). Research conducted by the Australian Communication and Media Authority (ACMA) notes the positive relationship between household income and the number of devices in operation (Australian Communications and Media Authority, 2008; 2012; 2014).

There are also indications that the adoption of new devices in the Informatic Context, like wearable devices, is associated with affluence. For example Swan (2013) identifies cost as a barrier to widespread adoption of quantified-self and self-tracking devices, with marketing firm The NPD

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lens for considering experiences around technology. With thanks to Reviewer One for this excellent observation.

[45] van Deursen and van Dijk (2014) are particularly wary of using any socio-economic measure to explore use, as they argue such measures are often unclear and include variables such as education and location that may skew results.

Group (2015) also finding that a majority of users (male and female) have an average income of over $100 000 USD (approximately $100 000 AUD at the time of writing). Initial data further suggest that the adoption of other wearables, like smartwatches, is also skewed towards high income earners (Olson, 2015). Additionally, the $100 000 threshold is reflected in research by the ACMA (2008), and Pew Internet Research Centre (Horrigan, 2009; Lenhart, 2015) as the marker for affluence in their studies. Therefore, there are some indications that income levels may be a factor in the adoption of technology, and for the possible ranges of behaviours present in users[46]. It is logical that the group with the highest adoption rates, and fewest barriers to uptake, is targeted.

**Recruitment**

Participants were recruited using gatekeepers who specialise in the sale, set up and maintenance of informatic technologies (particularly smartphones and tablets) and through advertising material, including social media posts, press releases and flyers distributed at sites that are linked to informatic technologies. A majority of gatekeepers were electronic and mobile technology retail businesses that agreed to assist.

The use of gatekeepers and snowball sampling in recruitment also means the possibility of homogeneity within the sample. Gatekeepers and participants may recommend individuals they wish to be involved, thus introducing homogeneity or characteristics that may bias the research (Hennik et al., 2011). While this is not necessarily a problem, as the purpose of a qualitative methodology is to gather rich data, the possibility of bias should be acknowledged and accounted for.

[46] In pursuing this approach it is important to note that this is done for reasons of practicality and pragmatism, and is not done in order to contribute towards broader sociological debates around differential access to technology, or the possibility of a digital divide (these themes are explored elsewhere by van Deursen and van Dijk, (2014) and Warschauer (2004) for example.

Following Mays and Pope's (1995) suggestion, efforts to increase the variability of the sample while retaining sampling characteristics were undertaken to reduce sampling bias. For example, advertising materials were placed in locations visible to large cross-sections of the community such as libraries and public spaces, in addition to technological-specific sites (like computer and mobile telecommunications shops), in order to try and recruit individuals from different backgrounds. During snowball sampling, requests were made for referrals towards specific groups that were currently unrepresented in the sample, such as women, in order to address this. This resulted in a near even gender balance of 10 females and 12 males. To limit the influence of gatekeeper bias that may emerge from the snowball procedure, attempts were made to increase the number of referrals drawn from gatekeepers. For instance, if a gatekeeper recommended an individual who was unsuitable, the unsuitable individual was encouraged to provide an additional link, increasing sampling coverage which Barbour (2001) identifies as means of addressing potential issues with purposive sampling. Despite these efforts, the small sample size and nature of the project mean that sampling bias is a potential limitation of this research (further discussion on the implications of this is raised in Chapter Ten). Analysis conducted here acknowledges the affluent, highly educated and geographically specific nature of the sample, and makes no claim of generalisability. The goal of this research is an in-depth investigation into meanings of social relationships with data amongst a small group, with which this sampling approach is coherent.

**Procedure**

Once recruited, participants were sent an information pack, including details of the study and the informed consent documentation. On return of the informed consent documentation, a time and location for the first interview was made. The locations were determined according to the convenience of participants. Two interviews were conducted for each participant, with the initial interview exploring issues that emerged within the literature relating to informatic technology and its use. The second interview served to further develop themes raised by other participants and

through initial analysis. If no contact was received with 14 days, a follow-up telephone call was made to check the participant's willingness to be involved in the research. To maintain safety while in the field, the researcher sent text messages at the commencement and completion of interviews, with the location and time of the interview to a nominated other. If both text messages were not received by the nominated other, additional steps were to be taken as required to ensure the safety of the researcher.

Interviews lasted between 30 and 90 minutes, and were audio recorded using a digital voice recorder. This allowed the interviewer to focus completely on the dialogue with the participants and not become distracted by verbatim note taking, while gathering an accurate account for transcription (Liamputtong and Ezzy, 2005: 67). Notes were also made directly after an interview had ended to capture as much relevant data as possible (Babbie, 2005: 316). This also provided the added benefit of allowing the data-immersion process to begin immediately alongside interviews (Willis, 2006: 264). Interviews were transcribed by both the researcher and a paid transcriber.

**Data Analysis**

A thematic analysis was used to analyse the data. This allowed themes that developed during the data collection process to be explored, and fits with the inductive nature of the research (Ezzy, 2002: 88). Analysis followed Green et al.'s (2007) method, and sought to provide explanations of social patterns and not just describe them. Green et al. (2007) provided a four-step process involving immersion of data in context, coding the data into descriptive open labels, categorising codes and identifying themes. For example, participants may describe how mobile technologies are used to communicate with others, co-ordinate social events with significant others, or how they prevent this. These individual codes can then be grouped under a category, such as technology and personal relationships. The themes of the category can then be explored and interpreted.

This analysis is sensitised with insights drawn from the EEA approach described earlier. Participants' statements are understood as contributing to ethno-epistemic assemblage on technology, a situated set of beliefs around a variety of informatic devices and technologies. Following the logic of assemblages, references towards nonhumans (such as technologies, digital services and informatic traces) and other heterogeneous elements (like external discourses or other individuals or social groups) are welcomed. These elements, and the narratives of participants' craft, are indicative of their social relationships and experiences: their personalised ethno-episteme. These insights are applied flexibly, with the aim not to rigidly sort participants into EEAs but instead to faithfully voice participants' different perceptions, experiences and beliefs around living with informatic technologies, and the many different possible directions and elements present therein.

**Ethical Considerations**

The project fully adheres to the stipulations of the University of Tasmania Social Sciences Human Research Ethics Committee (Ethic reference number H0012872). It utilises measures to ensure informed consent and maintain the anonymity and confidentiality of participants and the collected data. In this way, it addresses the three important ethical issues that Habibis (2006: 62) identifies as vital to sociological research: integrity[47], consent and research safety. Questions and topics explored within this thesis concern general technology use and ideas around data, and were judged as presenting a low ethical risk. There were few, if any, questions or responses that concerned ethically sensitive topics.

Before beginning the research, participants received an information pack with consent forms and all relevant information on the research. Interviews were not conducted without informed consent, and consent was reconfirmed at the interview, as was their ability to withdraw from the research at any time without penalty or consequence. In the event that consent was withdrawn after interviews

[47] Integrity and consent implicitly describing the measures taken to protect the anonymity and confidentiality of participants and also to maintain informed consent.

were conducted, the participant's data were to be retroactively removed from the transcripts and analysis. Pseudonyms were given to all participants to ensure their anonymity, with all identifiable information removed or renamed. Information linking participants to their pseudonyms was kept in a separate locked filing cabinet. All data collected was stored in a locked filing cabinet if physical or, if digital, either password protected or encrypted, with these records to be destroyed five years after submission has occurred.

## Conclusion

The Informatic Context is a heterogeneous entity, and this thesis adopts Irwin and Michael's (2003) ethno-epistemic assemblage approach in order to explore this heterogeneity. It acts as heuristic device for this thesis, highlighting the varied and situated composition of social relationships in the Informatic Context (including those to nonhuman such as technology and data), while suggesting tools to understand the many elements involved in participants' realities. This perspective is desirable as it provides flexible tools for understanding aspects of the Informatic Context and the relationships present within it. The interactions of interfaces, circulation and abstraction are manifold, and leverage both human and nonhuman elements to create different social relationships. Because of the varied nature of the Informatic Context, and the relationships that this thesis explores, the combination of EEAs and qualitative methodology is the appropriate choice for answering the research question. Again, it is important to note that this approach is not applied rigidly. Ethno-epistemic assemblages are heuristics, flexible concepts for considering complex socio-technical situations. Their use here reflects a fluid and flexible use, with the qualitative process sensitised with these concepts, and not as a prescriptive or linear methodology.

With this approach and a qualitative methodology that samples a particularly data-rich group of participants as described, this thesis now moves to the accounts that participants provide, to show what it means to live as an Informatic Person.

# Chapter 5 — Welcome to the Machine: Informatic Adoption and the Obligation of Use

## Introduction

Although Informatic Persons are not required to explicitly state their belief or adoption of The Informatic Context, many participants identify a moment in which they do join. This moment of joining is not a uniform experience, materially or epistemically, and does not entail a wholesale commitment to all aspects of the Informatic Context (materially or epiestmic). Instead, it is a behaviour negotiated against internal and external desires and pressures. This is visible in the acquisition of an interface device, most commonly a smartphone or tablet. It is the experience of adopting these technologies and associated services which are the focus of this chapter. Participants create different ethno-epistemes around their adoption of informatic technologies and services based upon three trajectories: active, passive and critical adoption. Active adoption describes a concerted focus and desire to adopt the technologies of the Informatic Context, whereas passive adoption refers to joining the Informatic Context through happenstance or circumstances. Critical adoption describes a less clear vision of technology use, and the ambivalence of some participants' EEAs around acquiring and using an interface. A central theme in these three adoption processes is the idea of obligation. The integration of the Informatic Context into everyday life means the decision to adopt and use specific devices and services is often coming from outside of the user, even when there is no intention to acquire. Entities both proximate and distant are implicated in this, as the Informatic Context affords mediated relationships of considerable scale. The benefits and additions of informatic technology lie not only in their obvious functionalities, but also in how acquisition satisfies external needs and expectations. These expectations are not uniform. Discussion on critical adoption will illustrate how participants describe alternative and ambivalent narratives on adopting technologies. In some instances adopting into the Informatic Context is problematic, and

participants do not shy away from illustrating the difficulties and shortcoming of technologies once they have been adopted.

## Active Adoption

The adoption process of many participants can be described as being "active". Here adoption represents a concerted and direct effort to acquire and use technologies that are a part of the Informatic Context. It may seem that exploring this kind of adoption is unnecessary. In a society saturated with informatic technologies it is understandable to assume that the desire to adopt and use technology is the default of modern persons. To do so, however, homogenises the experiences of users and fails to account for any nuances present in the adoption process. As Dourish and Bell (2011b) state, in situations where digital technology is omnipresent and ubiquitous, the prominence of technology can obscure the messy and contested work that goes in to making this technology function. Thus exploring expected results, such as participants' active acquisition of technology, is still important in uncovering these contestations. As will be advanced below, nuances are present in active acquisition, particularly around the idea of obligation. Active adoption goes beyond individual desires for individual interfaces or services (circulatory or abstractive), and instead reflects an obligation to acquire and use technology that facilitates the Informatic Context.

The basis of active adoption comes from the integration of informatic technologies into everyday life. With technology so present in many personal and social contexts, technologies such as interface devices are often sought out by individuals to gain access to new abilities within these contexts. This is described by Julia:

> I wanted to be able to check in and keep connected to work whilst I wasn't at work. And I wanted to be able to do the stuff, the Facebook and texting and stuff easier with my friends. And children. Children is a big one actually, and [using the instant

> messaging application] Kik and that sort of thing, that's how I mostly communicate with them. And I just had a different type of mobile phone before, but I don't think it was a smartphone. But everyone else in my family has had them for much longer than that, and are really integrating in their use. — **Julia**

This quote highlights practical instances in which informatic technologies are integrated into everyday social practices, particularly those relating to Julia's family and work contexts. In both instances she highlights how practices and functions within these roles (as a mother and as an employee) are linked to the Informatic Context. She broadly describes a need to "keep connected to work" while she is physically absent from it, reflecting a growing number of empirical (Middleton, 2008; Russell et al., 2009; Wajcman et al., 2010) and theoretical (Gill and Pratt, 2008; Gregg, 2011) perspectives that highlight a belief in the importance of constantly being available to one's employer. This persistent and constant availability is not framed as necessarily negative (for a critical view see (Turkle, 2008b), but instead is viewed by Julia as a driving factor for the acquisition of informatic technologies. She describes how she communicates with her children and friends, and emphasises that the dominant means of communication for them is through constantly available digital services. Specifically discussed are circulatory platforms such as social media (Facebook), Kik (digital instant messaging service, native to Apple products) and text messaging (via telecommunication network). Everyday social life for her and her family is therefore saturated and closely entwined the Informatic Context. Such an integration represents a complete realisation of what Thomas Hughes (1986) describes as the seamless web between human users and technology. Although he spoke of more general and historical contexts, he emphasises the inseparability of technologies from everyday life. The seamless relationship and place that digital technologies have in everyday social life represents an important factor in Julia's decision to actively adopt the informatic, and become a fully fledged Informatic Person.

By adopting technology to gain complete access to everyday socio-technical situations, Julia reveals how an ethno-episteme around adoption can be strongly influenced by a notion of obligation. Although the Informatic Context is not physically forced upon a person, the enormous presence of informatic technology in everyday life means that complete participation in society often requires access, and therefore adoption. Alternatives maybe sought, but this does not guarantee the capacity for full functionality and total connectivity with others in the same way that adopting the Informatic Context does. Therefore, if a person wishes to have access to engage with the Informatic Context and its associated social practices, they are obliged to adopt. The notion of obligation is prevalent in research on socio-technical networks, particularly in Actor Network Theory (ANT). As a part of their work on ANT, Latour (1991; 2005), Callon (1986) and others (Hardy et al., 2001; Munro, 1998; Star and Griesemer, 1989) highlight how groups of humans and nonhumans come together to create the effects of what is referred to as society, through forming actor (or actant) networks of humans and nonhumans[48]. The Informatic Context's entwinement with daily practices means that for Julia to fully engage with these practices (her work, family and friendship commitments) she must adopt elements of this context (an interface device for example). This is not to suggest that she cannot have friends or family without the Informatic Context. Instead, Julia's case highlights how full participation in these relationships, some of which are highly positive and desirable, can only be achieved through adopting elements of the Informatic Context. Technology can therefore act as an obligatory passage point to Informatic Persons, becoming essential to functioning in everyday life, and developing obligation as an important theme in adoption.

[48] Part of the creation of this effect, and the successful formation and maintenance of the network, is via the formation of obligatory passage points (OPPs). These are points within a network that all other actants must pass through in order for the goals of the network to be achieved. For example, in his classical paper on the farming of scallops, Callon (1986) notes how scientists bring together a varied group of human and nonhuman actants, and then align them so that other actants must pass through the scientists in order to succeed in their daily business.

The integration of the Informatic Context into the lives of users is so seamless that it has to some become naturalised and taken for granted. This is raised by Lynda:

> **Interviewer —** So tell me a bit more about other things that are integrated with your device.
>
> **Lynda —** So, well I mean, you can sort of break this right down to nth degree I suppose. Even on the iPhone you know the integration of photographs and being able to Bluetooth those from one phone to the other or put them on Instagram or Facebook and share those with your friends and family or text those, message those to family in an instant. You know those kind of things obviously, they're simple things but they seem simple now cause we do them every day but those kind of integration, they have happen on a daily basis you know, a weekly definitely. A weekly basis. But from a work or organisational perspective I think even being able to cite documents, look at reports, download documents, those kinds of things, is very useful and I, on my iPad I've even got apps that help me be able to mark up drafts of [a] document and send comments back for review or peer kinda feedback. So they help you know, from a work perspective as well. It's hard to think about it because you take for granted that this is what we do.
>
> **Interviewer** — It's very much normal.
>
> **Lynda** — It is. It's definitely been a normalised part of working and personal life.

There are few aspects of Lynda's practical reality and everyday operations that are separate from an interface. Both her personal engagements (such as family and recreational time) and her professional work (organisational and productivity tasks) feature some degree of contact with the Informatic Context. Whether it is using an interface device to access content (her iPad or iPhone),

accessing circulatory and/or abstractive platforms to share information of a personal (Facebook and Instsgram) or professional (documents and reports) nature, or even in how she communicates with her friends and family (text messages and using Bluetooth to share photos), everyday activities are practically inseparable from the Informatic Context, being the norm, rather than the exception. Lynda's example concretises how the close integration of the Informatic Context can create obligation. Informatic technologies are so seamlessly associated with everyday social practices that the non-use of technology becomes unusual and then undesirable for people living in the Informatic Context. This is illustrated in literature on the diffusion of innovation, which suggests that once a critical mass of market penetration has been reached, a successful innovation will generally have a majority of the population (85% and higher) as users (Rogers, 2003). Only individuals referred to as "laggards" will not take up the technology in question, often citing cultural or socio-economic reasons for their non-use (Greenhalgh et al., 2005). While it is still possible to reject dominant technologies, in doing so there is a possibility of discrimination and disempowerment for non-users (Wyatt, 2003). This is in part because such innovations are no longer innovative per se if they are commonly adopted, and act instead as standards. According to Bowker and Star (1999) standards are largely invisible rules and expectations that hold societies together, making different objects/ideas/people comparable and compatible across contexts (Timmermans and Epstein, 2010). Informatic technologies occupy a point in society, indicated by Lynda's statement, where use and integration have a reached a critical mass, and there is an expectation of use for modern persons. If one wishes to be involved in everyday social life in the Informatic Context, then the use of the informatic becomes an obligation.

**Functionality, Positivity and Obligation**

Obligation does not equate to coercion or duress. As discussed above, Julia indicates that she wants this access and Lynda's statement is largely positive. As John describes below, the notion of

obligation is also married with the practical reality and affordances of the Informatic Context, and how the devices and services are highly functional and helpful in his experience:

> **Interviewer** — Okay. So that [adopting informatic technologies] changed the quality of interaction because of technology that's beneficial for your business dealings?
>
> **John** — Yes.
>
> **Interviewer** — How so?
>
> **John** — Obviously, [changes are visible] in the other interaction you can have because of the multimedia choices you've got available. Swapping pictures, swapping files, discussing [something] by phone by SMS or prompting things, reminders, sharing your priorities, to-do list, things like that. People view the MyCalendar [application] from afar [...] Where I can see my appointments a bit more effectively. I can see where I [have] got more free time or whatever.

While the centrality of the Informatic Context does afford obligation, the technologies and services being obligated are also functionally beneficial. As the quotation from John indicates, in the context of his business informatic technologies are conceptualised through their functionality and utility, with John highlighting *what he can do* with informatic technologies. Using informatic technologies affords John new opportunities to interact through his work using multimedia, digital organisation tools and communications abilities in a manner that benefits him. While it may be the case that he is obliged to adopt these functions because his work context requires or demands it of him, John's conceptualisation of technology also highlights how he is supported through technology. This ethno-episteme of enabling and facilitation (a theme raised later in Chapter Eight) comes from the fact the platforms of the Informatic Context can be understood as what Law (1992) and Latour (2005)

describe as mediators[49], which can effect change upon the quality of interactions a user has with the technology. For example, John describes how his ability to organise his calendar and share photographs has changed his business practices and prompted his adoption of technology. It was entirely possible for John to share photos and organise his calendar without these, as both functions exist separately in a hardcopy format, but through the affordances of the Informatic Context these interactions have changed in a beneficial way. Interactions are not exactly reproduced, but altered in a desirable way through the Informatic Context. It should also be noted that this does not also diminish the possibility of obligation. John may adopt technology because he is required to as a part of his business, but this is not necessarily forced.

It is through these kinds of alterations and mediations that users highlight the benefits of the Informatic Context, and why they adopt its features. This is particularly clear in everyday social practices, as Eliza describes below, with the affordances and mediations of the Informatic Context equipping her in a way that allows her to better communicate with her family:

> I don't know what my kids are doing unless I'm online because when things [happen]. Yeah. I can, they will more likely contact me online, I'm sorry to say, on Facebook, than they will on the telephone. Or if I need to talk to them. One son doesn't answer his phone because he's got poor reception, everyone knows not to call me because I've got poor reception and live in the country. [My daughter and other son] work shift work. I have no access to my kids except via messages to their partners and [through digital] stuff. — **Eliza**

[49] Building on previous discussion on Actor Network Theory, Latour (1996b) notes the different exchanges within a network of human and nonhuman actants (e.g. technologies). Within networks there are intermediaries that simply transmit or carry a form of interaction without effecting any change upon the quality of the interaction, and mediators, that offer some change.

Combined here is both an illustration of how the mediations of the Informatic Context benefit a user and lead to the adoption, but also the subtle sense of obligation that is linked to it. Eliza describes how without access to interfaces (telephone) and circulatory systems (Facebook) she loses contact with her family, and this has driven her to adopt the Informatic Context. In this way there is a degree of obligation present, as these technologies have become the sole means of keeping in touch with her family given their different geographical and social contexts. Her family lives away from her, some are engaged in shift work, and are difficult to get in touch with. Eliza could try other means of getting in touch, but there is no guarantee this would work. Given that her children are already immersed in the Informatic Context, the use of similar services/devices becomes a point of common contact and convenience. Thus her adoption ethno-episteme is heavily influenced by the central and integrated nature of the Informatic Context, as it has become the most available avenue for contacting her family. This availability and obligation is also shaped by the affordances of the platform in question (for example, the functions of Facebook) and how interactions that are digitally mediated have specific benefits for Eliza. As noted above in the discussion on mediators, the Informatic Context can change the quality of a relationship, a point Eliza notes and believes positive. She indicates that through being asynchronous and not requiring simultaneous expressions of attention in order to have an interaction (Katz and Aakhus, 2002), interactions in the Informatic Context are beneficial. They can occur across different times and contexts, and do not require a user to be constantly present (physically or mentally) to communicate. Eliza demonstrates this through noting how her children are often physically distant, have poor reception, and work on different time schedules. Digital messages can be created, shared, stored and accessed without requiring the input of the intended recipient (like a telephone call does), allowing Eliza to maintain contact with her family. Thus digital mediation positively defines her interactive options, and provides a positive and facilitating reason for adoption that exists alongside the obligation narrative.

Processes of active acquisition, however, do not have to be functional in nature. For example, in Mandy's case, the decision to acquire informatic technologies was about amusement and enjoyment. This displays a different kind of positivity in that it initially is not linked to functional narratives such as efficiency or connectivity. Obligation remains a factor, as Mandy's use of informatic technology evolves to find a place as a part of her work practice:

> [My iPad is ] a toy. I didn't really get it for [work] — I use technology at work a lot. I got it because it was new, because I thought I might use it outside of work instead of using a computer for initially just net browsing, that sort of stuff, initially [...] it's become more of a work device as well. It is still the major part of what I do use it for but I do use it for work now as well. I use it as a graph pad, I guess, or a graphics pad in lectures. [...It is a really] nice device, yeah and you can record the lecture.
>
> — **Mandy**

The original meaning and purpose of Mandy's adoption of ethno-episteme is pure novelty and amusement, as she purchases an interface device as a means of engaging in recreational time (such as browsing the internet) away from her desktop computer. Mandy's conceptualisation of her device as a "toy" highlights the relationship that mobile and digital technologies have with entertainment and cultural practices, a further indication of their entwinement into everyday life. Their use as a toy is not surprising, as interfaces are increasingly replacing desktop personal computers (International Data Corporation, 2015) and laptop devices (Paul, 2013) as the primary means of internet access and digital connectivity, both globally and in Australia (ACMA, 2014). The affordances that interfaces offer mean they are ideally equipped to provide new experiences of leisure and novelty to their users (Hjorth, 2007a; Licoppe and Inada, 2006; McCrea, 2011). From applications (examples of abstraction) that use geo-location data to create a hybrid space of digital and embodied interactivity (de Souza e Silva, 2006), to dedicated gaming applications (Keogh, 2014), or a digital media platform

for capturing and viewing media (Fortunati, 2014; Goggin and Hjorth, 2014), digitally enabled devices are ideally equipped for playful forms of use.

However, this leisure-driven acquisition is juxtaposed against how the Informatic Context comes to be positioned post-adoption, as Mandy describes a seamless transition from novelty item to productivity device. Although originally a toy by her own reckoning, Mandy now uses her iPad as an educational tool, using it to further her capacities as a university employee. She now records her lectures, teaches and demonstrates with her iPad. This demonstrates the potential function creep of the Informatic Context, as Mandy had no active desire or intention for her device to be for work. She states she had lots of technology at her workplace already, while also noting the positive experience of now working with her device. Her device and its usage has expanded itself beyond its original passive purpose, highlighting their fluidity. Mandy experiences these as a positive, noting the contributions the Informatic Context has to her work. These contributions are also positive for her employer, however. They enable Mandy to work more easily and to conform to the expectations of her managers and employers in the tertiary sector. As has been noted, universities are increasingly pursuing an agenda of electronic and digital learning (Davies and Bansel, 2010; Mahdizadeh et al., 2008) and a more managerially accountable style of service (Shore and Wright, 1999; Zeichner, 2010). In doing so, the Informatic Context changes the device from a playful accessory to an essential and expected aspect of Mandy's work. This illustrates the continuing possibility of elements of the Informatic Context to be understood in terms of obligation and expectation across the adoption process. Even when acquisition is driven by rationales that seem distant from any potential source of obligation, these rationales can evolve and reframe adoption. It also suggests that the intended context and scope of relationships in the Informatic Context may vary depending on the mediations of technology.

**Obligation, Adoption and Lacking**

The potentially obligatory nature of the Informatic Context is further revealed by participants who connect their adoption behaviours to ideas of loss or lacking. So far, participants have indicated how interfaces and other informatic services can be obligatory due to their entwinement with everyday life. Because of this relationship, technologies are actively sought out to gain new features that allow full functioning in everyday life. Some participants do not view this obligation in terms of how it might add value or capacity to their lives, but instead in relation to the potential loss and lacking that non-adoption presents. Adopting is a means of avoiding missing out, and addressing shortcomings present in everyday life. This is demonstrated by Norman, who frames the practical uses of informatic technology against what it means to miss out on them:

> You notice it [when you're without your device]. It is not something where if you don't have access [to] this information on hand you don't notice that it is missing, you definitely notice it is not there and it does make some things a lot harder [...] I just find it useful, it fits in with everything else you do considering how much time I actually spend on computers. When it comes to banking, if you have multiple accounts, you tend to rely on it pretty heavily just moving money backwards and forth, as well as your usual social media stuff, Facebook and that sort of stuff, you know, making calls and texting. **— Norman**

The integration of the Informatic Context into social relationships is so strong that to be without access is viewed as an indicator of being backwards, deficient or lacking. On a practical level everyday activities have become tied to the Informatic Context, such as in easy access to bank accounts via a mobile device or communication through social media. Andrew also develops the relationship between adoption, obligation and a sense of lack. While speaking more generally, he indicates how non-adoption creates a certain image and self-presentation of the user that is defined by this lack:

> Well basically just realised that they [non-users of informatic technologies] are way behind the technology, there are so many more features you could use other than just the phone, contact and communication. — **Andrew**

By referring to those who have not yet adopted technology as being "behind" because of their lack of access (or desire to access) digital features, Andrew builds on Norman's practical observations by suggesting that non-use has negative personal connotations. This is a reflection of the centralisation and normalisation of the Informatic Context. Digital technologies are so integrated into everyday life that non-use and non-adoption are potential indicators of a user's personal failure. Adoption and use is therefore obligated to avoid these negative judgments. The association of non-use and non-adoption with a negative connotation reflects a potential for what Goffman (1959) calls stigma, a persistent and socially negative judgment of a person, based upon some social behaviour, personal attribute or social circumstances (Goffman, 1963). Studies of mobile technology have linked certain patterns of use as potential sources of stigma, depending on the context of use[50] (Campbell, 2006; Monk et al., 2004; Persson, 2001). By connecting their adoption to potential situations of non-use and non-adoption, and how these are viewed negatively, stigma is linked to adoption. Non-use and not being fully connected to the Informatic Context has the potential to send a message to others that negatively defines them. Thus adoption, and the obligation to start using informatic technologies, is a response to what a lack of access means both practically and personally.

Users who actively seek out informatic technologies do so because of the dual notions of obligation and functionality (as defined by the affordances and mediations of the technology itself). The pillars

[50] Depending on the location and social context, the use of a smartphone or mobile device can be met with negative sanction and stigma. But as Humphreys (2007: 349) indicates in her interpretation of Goffman (1959), it is important to consider the information that possessing and using mobile technologies sends to others about us unintentionally, just as much as the information we intentionally give through mobile interactivities. Previous studies have indicated how certain kinds of use convey information that creates stigma but, unlike this study, they do not consider the possibility of non-use.

of the Informatic Context offer functionalities and abilities that were previously unavailable to the user, and their acquisition allows them to better engage in their social contexts and practices. While participants' adoption ethno-epistemes are reflected upon without malice or annoyance, there is a degree of obligation present. Ideas or expectations of functionalities and obligation are not necessarily present from the outset, but manifest themselves as the process of adopting and using technology develops. With the integration of informatic systems into the assemblages of their everyday lives, the use of technology becomes less of a choice and more of a requirement and condition of complete functionality. Thus, the active adoption of technology is also marked by an obligation to gain access and connectivity lest they be left behind and unable to fully function in their social roles. This is not necessarily viewed by respondents as a bad thing or implied that technology is forced upon them, they actively desire it. The affordances and functionalities of the Informatic Context create a social connectivity and cohesiveness that is positively received and reciprocated by participants. Users are more connected and enabled through informatic systems. These experiences are desirable to a user, and manifests as the active commitment to the Informatic Context, even though this may be applied by an external force. Participants simply do not want to lose the connective affordances and social relations they now have. This can be simultaneously understood as an active and positive desire for functionality, and as a sense of not wanting to be left behind. Obligation is therefore just as present as the desire for function and experience.

## Passive Acquisition

Not all participants actively seek out aspects of the Informatic Context, despite eventually coming to possess them. A selection of participants describe how their acquisition of informatic technologies was instead "passive", coming into possession and use through circumstance or serendipity, instead of a desire to engage with the Informatic Context. This does not mean that they are actively resistant to, or rejecting of, informatic technology. Rather, their ethno-epistemes are not marked by any

driving desire or intention to gain access to the Informatic Context. This also does not mean that their acquisition is random or incoherent, especially compared to previous discussion on active acquisition, but rather a product of their circumstances. Ideas of obligation and the requirement of use are still present in users who describe passive acquisition, as are positive assessments around their affordances and mediations. The difference here is that these narratives are not necessarily originating from or driven by participants, and are instead centred outside and external to the user as a part of their external context. It is already the case that external pressures encourage, and therefore obligate, users to actively pursue informatic technology, with active adopters' own perspectives aligning with this. Passive adopters are more personally indifferent, but their context still features an obligation of use to which they are relatively receptive even if they do not enthusiastically embrace it. For example, consider the following statements made by Albert on acquiring the two interface devices he uses, one being a tablet device (iPad):

> The iPad kind of fortuitously came our way [as a gift], and yeah I don't think it was something that we probably would have got otherwise. — **Albert**

Albert's other device is a smartphone (iPhone):

> No specific reason, it was just [that I] had, as you called it a dumbphone, and its contract was up. I got a new contract and got to select a new phone as a part of renewing that contract, and just went with the one and that was it. No desire specifically to select a smartphone. — **Albert**

These statements suggest a level of indifference for Albert regarding the Informatic Context, and to circumstances that presented or encouraged the use of these technologies (as gifts or as matters of procedure for example). Albert is not against the Informatic Context and does not reject use of these devices, but he is not actively driven to acquire them. The relationship with obligation here is also

subtle, and only present in relation to acquiring a smarpthone interface. Albert previously had a "dumbphone" without digital connectivity, and did not seek to upgrade. His new contract, however, mandated a new device that was digital, even though his original device was still functional. Obligation to adopt the Informatic Context occurs because of changing technology accompanied by recurring contract renewal. It reflects what Slade (2006) describes as "planned obsolescences", where technologies are planned and designed to be replaceable and obsolete after a point in time, even though they may still function. Dumbphones[51] were not designed to have informatic capabilities and to keep up with socio-technical changes that have appeared with recent services and infrastructures. New technologies are thus obliged via external sources.

**Passive and Contextual Obligation**

Participants' work and employment experiences are indicated as a site in which obligation can develop in instances of passive acquisition. Data network and digital technologies are a driving factor in modern economic conditions (Beniger, 2009; Castells, 1996), so it is unsurprising to see their use as a prominent feature. While prominent in an organisational setting, the sense of obligation expressed is often quite subtle. As Belinda demonstrates:

> So I have an iPhone 4, on 3G network. And that's my work phone, but I do use it as my personal phone. We also have a work iPad. That I use on occasion. Both for work and ... to let me look up stuff. I used that a lot when I was studying. [...] I've always had a mobile phone, but the iPhone [my employer] gave to me as an upgrade so I could check my emails mainly. And so primarily I use it for that, but I do use it for other things. Other apps and bits and pieces? — **Belinda**

Personal motivations and circumstances may play a relatively minor role in this adoption ethno-episteme. Belinda indicates she previously had a non-informatic device (a mobile phone) but that

[51] Pre-digital phones.

her employer had equipped her with two interfaces (iPhone and iPad) in the course of her employment. Adoption circumstances signal the importance of the Informatic Context to modern workers and workplaces. The adoption of technology generally (MacKenzie, 1984; Marx, 1867), and of interfaces specifically (Goggin, 2012; Jarvenpaa and Lang, 2005; Sarker and Wells, 2003), has been linked to narratives of increased efficiency and productivity in various economic and institutional environments. Data technologies are fundamentally changing the relationship that workers have to their work, their work environments and the very nature of work itself (Gill and Pratt, 2008; Gregg, 2011). This ultimately benefits the managers and owners of the machines and the capitalist system, and not the workers[52]. Belinda's passive adoption of the informatic through her employer subtly reflects the idea of control and obligation. Specifically, by providing Belinda with informatic access, her employers obligate her to engage in informatic interactions that change her relationship to work. This occurs in a manner that is beneficial to her employer first, and Belinda second. Belinda demonstrates this as she describes checking her emails and completing a course of study for her employer, both of which constitute forms of digital and cognitive labour (Fuchs, 2014b; Gregg, 2011; Wittel, 2014), while being framed in a manner that potentially benefits her (providing her with more tools for her work and study for example). Belinda's work practices are also changed, as having an interfaces means she is constantly reachable by work colleagues and has the potential to work while away from the physical office. The control and change expressed here is a Deleuzeian kind of control (Deleuze, 1992), a soft and modulating digital influence around a person that comes to interface with many aspects of their life. Belinda's relatively neutral and passive disposition towards the Informatic Context allows adoption to be a means of subtly making Belinda work and use technology to her employer's benefit. It should be noted, however, that Belinda does not frame this as having a

[52] Braverman (1998) has explored this in the pre-digital context, and emphasises the importance of control in the adoption and application of technology. He suggests that industrial technology is not present to ease the burden of labour for workers, but to provide a means of controlling and carefully managing labour.

negative personal impact, as she notes that while she does use her devices for work, they have other functions in her life that are personally beneficial, suggesting a negotiated nature.

**Uncertain and Passive Obligations**

While passive acquisition of the Informatic Context may lead to persons being obligated in some way, this relationship is contextually situated and not at all guaranteed. While Belinda's employment context successfully manages to establish this obligation, Bruce presents an alternative story of passive acquisition. In the quotation from Bruce below, even though the obligations to use an interface device for work purposes were apparent, achieving this is not assured for employers:

> I was as part of a team that won a national award and there was some money associated with that. And the money had to be spent by the end of the calendar year in 2011, [and I] couldn't make up my mind what I wanted to spend it on. And people in Hobart, at [the other branch of my organisation], which was my previous employer, said get an iPad, and I thought fair enough, and I mean an iPad can be used at work, I think I've used it twice in all that time. [...] I think I've only brought it twice to work. I tried it recently having a communication with [a manager] in Hobart, but [we were] better off on the telephone, [the iPad] just didn't work so well. **— Bruce**

Bruce's adoption ethno-episteme is clearly passive in that he had no real intention or desire to seek out an interface, but did so through the encouragement of his employer. This encouragement can be understood to represent an obligation of use, with his employer suggesting that he acquire a device that can also benefit his professional work. Such a suggestion by employers to purchase an iPad draws on what Bijker (1997) and Pinch and Bijker (1984) describe as the interpretative flexibility of technology. Interpretative flexibility refers to how the meanings and uses of technology are socially defined. Because they are socially defined, the nature of technology is fluid, potentially having many different uses and meanings depending on the context. This multiplicity is present until an effort to restrict or limit a technology's interpretive flexibility is achieved. Suggesting the purchase of an iPad

may have multiple meanings and uses, and while acquired through positive circumstance, an iPad can hold a functional and productive capacity, just as much as it can be a personal device. Just because the device can be used for work however, does not automatically mean it will be used for work. As Bruce describes, it was largely incompatible with the work practices amongst his colleagues, with the telephone ultimately being more productive. This reinforces the contextual nature of technology use and its associated meanings, and of the different kinds of acquisition that the participants indicate. While obligation is present in passive acquisition, Bruce's experiences of obligation does not automatically equate with use and engagement with the Informatic Context. Obligation may be a strong driver in acquisition, but it is also contextually situated and potentially contested.

## Critical Adoption

The final adoption ethno-episteme that participants describe is that of critical adoption. The defining characteristic of this group of users is not how strongly they are invested in technology (as per Julia or Lynda) or what factors drive (or do not drive) their adoption of the Informatic Context (as per John or Eliza). Instead reflections on the consequences and implications of the Informatic Context form the basis for how they conceptualise their adoption. These participants eventually adopt the Informatic Context, but approach or reflect upon this process with ambivalence. For them, there is no denying the positive and functional possibilities of the Informatic Context and of becoming a fully fledged Informatic Person. But there are also negative possibilities, such as disappointments and failures of functioning, and undesirable consequences of adoption and use that cause significant ambivalence in some users. These critical ethno-epistemes sometimes exist before and during the adoption process, or are post-hoc reflections on a user's adoption on the basis of use and experience. These ambivalent and critical perspectives on adoption reflect the fragility and intricacy of the socio-technical assemblages that define and facilitate the Informatic Context, and how despite

the popularity and importance of informatic technology, the reception and experience of adoption (and use) is fluid.

**Hype Versus Functionality Realities**

One of the most obvious ways in which participants illustrate a critical perspective on the Informatic Context is through comparing the hype around the promised functions of data technologies and services prior to adoption, to the actual experience of use. As Silverstone et al. (1992) describe, the adoption of technology begins long before the technology is purchased. Before purchasing technology, mental work occurs such as imagining how the technology could be used and integrated in their lives. For Silverstone and his colleagues (Silverstone and Haddon, 1992; Silverstone et al., 1992; 1994) and others (Haddon, 2007; Morley and Silverstone, 1990) this idea is a key part in the domestication approach towards technology. They collectively argued that technological systems, particularly media systems, transitioned from "wild" products into "domesticated" devices in the context of households, as a part of what they called the moral economy of the household. The moral economy of the household is the economic, cultural and moral exchanges made within the family unit in which technology acquisition and use rests (Lacey, 2007). The idea of the moral economy does not feature strongly for users here, but this pre-adoption work does. Some users identify a disjunction between imagined uses and the actual experience of use, which provides the basis for the ambivalence and critique participants describe. This is explored by Rich:

> Well my [old] phone was wrecked, it wasn't working anymore, and I ended up decid[ing] that it was time for me to get something I could use to browse the internet [with] and things like that [...] they are known as being smartphones, but a lot of the time they do a lot of stupid things, or they are very difficult to use, sometimes they are slow, sometimes the internet connection doesn't work. Sometimes they are just more of [a] hassle than they are useful. [... For example]

> just a little bit, just the tiniest little bit of water. Whenever you try to operate the touch screen on a smartphone, it still becomes very difficult to recognise what buttons you are using, and basically it can type the completely wrong things if you're attempting to do so [...] You can't even flick them with the leg of a mosquito and they will crack in half. — **Rich**

The gap between the imagined and expected capacities of an interface, and the actual experience of use, causes Rich to reflect critically on his adoption. Of particular importance to Rich's negative evaluation are the material and physical aspects of use. Rich sought a new interface after the physical failure of his old device (a mobile phone that was "wrecked"), and the promise of new functionalities. Yet it is the physical aspects of use that create a critical perspective. As discussed previously, socio-technical experiences and usages are shaped by the affordances (Gibson, 1986; Hutchby, 2001) of the material object, or the behaviours that are encouraged or discouraged based on the materiality of an object. This is a critical factor in how technologies are used and experienced. What Rich is discovering here is the true nature of this, and how the potential affordances of a material device are not always what they seem. Michael (2000a; 2000b) understands this by reflecting on how socio-technical assemblages, like that existing between a human being and their interface, is subject to a number of mediating relationships between technologies (often mundane), human users, the environment and possible action(s)[53]. Rich's experience demonstrates the contingency of digital functionality upon the success of these various material relationships, and

[53] In Michael's (2000a; 2000b) work, through exploring how a mundane technology (the walking boot) shapes how a human user (a bush walker) experiences the environment, and the possible activities in the environment, Michael demonstrates how physical and material factors can shape human experience. A particular experience, such as the sublime experience of nature, relies on all these factors coming together to provide the appropriate message to the user. They are "interven[ing] and influenc[ing] these messages and they do so in heterogeneous ways" (Michael, 2000b: 115). But in doing so Michael also demonstrates their contingency to each other. A failure in one aspect (such as the integrity of the walking boot on a dangerous path) can drastically change the experience of walking, with different messages created. There is no sublime, but pain, if the walking boot does not support a walker's ankle on rough terrain.

how it only takes one aspect of these relationships to change in order to alter his experience. Too often discussion upon the digital has concerned the immaterial, ignoring the materiality of the digital (Leonardi, 2010). Digital technologies have material roots in devices and infrastructure that create the experience of use. Rich's experiences highlight the importance of this materiality in the expectations of use that form his adoption EEA. He assumes and expects his new device to be physically capable and usable. He finds, however, that it too has physical and functional weaknesses, such as not responding as desired if moisture is on his hands. This is a problem for Rich, who works as a personal trainer and often has sweaty hands. The device's response to Rich's hands represents one of the mediating relationships necessary for a functioning interface, but this sweat and moisture is what Michael (by way of Serres, 2007 [1982]) describes as a parasite, "a disruptor of a signal between communicator and receiver" (Michael, 2000b: 114). Thus the relationship and exchange between parts of the assemblage are changed, altering the experience of use for Rich. As a consequence, he reflects critically upon adopting his interface, as it proves to be just as physically problematic as his old phone, albeit in a different way.

The material context around a user is not the only mediating relationship present in accounts of critical adoption. As Melissa describes below, there is a broader assemblage of socio-technical factors that influence use. Just as in Rich's case, Melissa describes how this assemblage produced another conflict in expectation, and furthers her critical reflection on adopting an interface:

> I knew I was making a compromise when I was trying to decide what sort of computer to get because I wasn't really thinking about the iPad, I wasn't familiar with it then. But I made the compromise and part of that, because I have also got a micro-business you might call it — barely functioning at this point in time — but that was my agenda when I bought this. [...] I was partly sold by the Splashtop desktop where you can remotely login to your computer that's on when you are away. It hasn't functioned well for my use. [...] And that's because of the limitations

> on 3G networks. When I am away from home and on the 3G network I can't access that program. — **Melissa**

The adoption experience Melissa reflects what Law (2009: 146) describes as the precariousness of socio-technical networks, and that in order for a desired experience or function to be created all the elements of the assemblage must communicate with each other. This is similar to Rich's discussion above, but occurs on a broader scale. For example, Melissa highlights that her rationale for adopting an interface featured a degree of compromise around the different features of the interface, and what she wanted for her micro-business. In particular, the ability for remote desktop access via a software program (Splashtop) pushes her towards an informatic device (iPad). For this function to work, all the elements of the Informatic Context (interface, circulation, abstraction) must communicate. This includes the software, the telecommunication and data networks to which she is a subscribed (the 3G network she mentions) and the device itself. Adoption is therefore a relationship that is scaled beyond the embodied context, with broader elements of the Informatic Context tied into functioning at an everyday level. As Bowker and Star (1999) describe, this is the invisible and taken for granted infrastructure of socio-technical interactions. Unfortunately, some of the elements of this network do not work as expected or desired. Law (1992; 2009) and other proponents of Actor Network Theory (Callon, 1986; Latour, 1996a) conceptualise this as a betrayal of the assemblage/network by one of its components, a failure to successfully negotiate and keep actants working together as a part of the network. This does not necessarily mean the end of a network, as any node can be replaced, or a new assemblage built (Mol, 2010), although this requires extra effort and resources. The failure in Melissa's EEA around adoption is not her fault, but a consequence of the nature of the network and the material complexity intrinsic to informatic interactivity that are often invisible. They become a black box that a user is not privileged to access, convinced that they will always work without being opened (Latour, 1999). When they fail this complexity is revealed. This is the case with Melissa's adoption. The unexpected precariousness of

the informatic functionalities she desired causes Melissa to recast her adoption in a critical light, as it has failed to provide the functionalities that she desired and that drove her adoption.

**Mixed Blessings — The Possible Harm of the Informatic /Possibility versus Pitfalls — What Does Adoption Mean for Me?**

The final group of participants to describe a critical perspective on adoption focus not on the potential functionalities and possible contributions that informatic technology will have, and instead are concerned with the possible harms of adoption. While active and passive users frame their use in terms of *what can I do with the device?*, such as the possible improvements in functionalities, activities and the ability to be fully connected in social situations, some users ask the opposite question. They frame their ethno-epistemes around *what can the device do to me?,* emphasising the potential for their interface device, and relationships made through the device, to negatively affect them. Adoption thus becomes a mixed blessing. The users below adopt the Informatic Context despite their concerns, often finding ways of negotiating some solution to their worries, but the fact that such actions are necessary illustrates their ambivalence towards the Informatic Context.

The trade-off between potential functionalities and consequences is described in broad terms by Kenneth:

> I wanted a brain-dead phone, not a smartphone, I wanted a phone that did phone calls in and out and text messaging in and out. That's it! I wanted specifically one that didn't serve the net, that didn't do any other bullshit. Mostly because I have a massive distrust of the current provider which is Telstra. The only one that we have at our place is Telstra. I've had a couple of packages with them. I have never ever had a correct bill ever. I have never had one I didn't have to argue blazes about. I basically utterly distrust them [...] So, yeah, I wanted that sort of phone. It's only been in the last three or four weeks that I finally decided I need a smartphone.

> Now, I don't want a phone that's smarter than me so I bought a semi-retarded smartphone. [...] It does annoy me that I am constantly scared at night that the damn thing is going to be roaming for the Abu Dhabi upcoming odds on the temperature or whatever. I don't want any of that good shit. But this is a flexible enough phone [where] I can turn that off and I can turn it off fairly easily.
>
> — **Kenneth**

Kenneth highlights two concerns regarding the Informatic Context that complicate his adoption. First, like Rich and Melissa (see above on page 110 onward), Kenneth notes the assemblage of socio-technical factors that comes with adoption and use. Secondly he is concerned with how this assemblage interacts with the capacities of his interface (a smartphone), to challenge his ability to adequately control and manage it. That scaled nature of relationship in the Informatic Context is therefore central to his concern, and presenting opportunity for complications and mistakes that make his adoption critical. Regarding the first problem, he (unlike Melissa or Rich) identifies that the successful use of his interface is linked to privately held digital infrastructure, and necessitates his involvement with circulatory entities such as Telstra (Australia's largest telecommunications service provider). Accessing data and telecommunication connections means subscribing to Telstra and their networks, something no other participant considers as a part of their adoption. In this way Kenneth recognises relationships in the Informatic Context that are not automatically apparent from their external features. In the language of ANT, Kenneth makes an effort to open the "black box" of technology (Callon, 1980; Latour, 1996a; 2005)[54]. Kenneth begins to open the black box and consider the impact of previously invisible elements of his technology use, particularly the circulatory infrastructures behind his interface. Through exposing infrastructure and having some awareness of its operations, he also exposes the various cracks and flaws in this system. Despite the best efforts of designers, and of the organisations themselves, the work of infrastructure is often messy (Star,

[54] Discussed in more detail in subsequent chapters (see Chapter Six), a black box is a sealed system understood only by inputs and outputs, and not by the internal components that make the system work.

2002). This scenario is the result of the contested nature of data networks and the work that goes on behind the scenes to make adoption and usage happen. A constant internet connection, and creating a relationship with services providers like Telstra, are unavoidable aspects of using an interface. Returning to the theme of obligation, service providers like Telstra (and competitors like Optus or Vodafone) therefore act as obligatory passage points in the Informatic Context. They reflect not a general sense of obligation and requirement, as has been discussed in this chapter as a part of participants' ethno-episteme, but are persistent and resilient nodes in the network, which are indispensible and unavoidable to other users. In order to successfully use his device, Kenneth is obliged to engage with a service provider as they are the only reasonable means of accessing digital networks. They therefore have enormous power over him, reflecting how broader socio-technical assemblages shape individual context in the Informatic Context. Because companies like Telstra have a monopoly over the material infrastructures, there is virtually no option for avoiding interacting with them. This means Kenneth must engage with an entity he has strong feelings about, creating tension on a personal level (as he expressed disdain at their management and corporate direction) and the practical level (through poor billing practices). This complicates his use, and is a source for his critique.

Running parallel to these concerns are issues Kenneth has with the smartphone itself, particularly its capacity for automated and independent functionality. Playing off its "smart" designation, the possibilities of automatic functions are viewed as a problem. Kenneth wants complete control over what his interface does, and thus describes seeking a "brain-dead" or "semi-retarded" device. The themes raised here feature consistently throughout subsequent chapters, particularly the notion of control (see Chapters Seven and Eight) and the importance of humans having dominion over their informatic status (see Chapter Nine). The automatic and algorithmic abilities of smart devices challenge Kenneth's complete control over his device, and the interactions that may have consequences for him personally. There is discomfort at what Pickering (2010) describes as the

"dances of agency" between human and nonhumans in the production of social action, in which agency swings between human and nonhuman in completing social life. Examples of similar dances of agency can be found in many ordinary social settings, including transportation (Callon, 1980; Michael, 1998) and medicine (Brenninkmeijer, 2013; Mol, 2002). The proximity of technology to the person, and its potential for close integration into the user's social context, challenges the belief of control over technology, a persistent aspect of modern life (Latour, 1993). In an effort to address these concerns, Kenneth describes seeking out an interface where the dance of agency favours himself and where his device has fewer functions. Thus his situation requires negotiation, compromise and creates a scenario for critical adoption.

Complications around adoption and use are not isolated to only the broader Informatic Context but can stem directly from the human user and the relationship of use that they have with technology. Such is the case for Albert, who presents a very critical appraisal of his adoption of his interface:

> **Albert** — [I am unhappy I got a tablet] Because you end up using it all the time. They are super-convenient, I get that. But they are a pain in the ass, because you just end up, it's too easy to just sit there and use it.
>
> **Interviewer** — So that's been your experience, you have to pry yourself off it?
>
> **Albert** — At times. Deliberately put it in another room so you don't pick it up.

The circumstances around Albert's adoption are raised earlier on page 105 onward, where a statement from him is used to describe passive adoption, as he received his device with no intention. Later discussion revealed a shift in his EEA around adoption, transitioning from passive acceptance towards irritation and annoyance. Although Albert has adopted the iPad as a part of his everyday activities, reflecting on this has led Albert to wish he had not acquired the device. The device is described as being too easy to use, providing a convenient distraction from his daily

activities. Its ease of use affords a compulsive sense of connectivity that easily becomes conditioned into other tasks. For example:

> **Albert** — [...] you can use [the tablet] whenever you want. That's also its downfall. In so much as you can sit there [and be] watching the TV and check your emails. It's almost Pavlovian. If it's there you will check it. At least that's what I try and avoid. Yeah, so, I can see their [tablets] uses, but I think that use is also their biggest negative as well, in that it's there and it beckons ... [use has not been] wholly positive.

Since adopting a tablet and experiencing the easy connectivity it provides, Albert has found himself unexpectedly conditioned to use it. Downtime, such as watching TV, suddenly becomes an opportunity to check data services like email. Easiness has given way to intrusive distractions that Albert views as negative. Technology allows work to creep into other domains, making his private life more opaque. This critical assessment of the Informatic Context is interesting given that considerable efforts have been made to make technologies both more accessible to users, but also easier to operate. In numerous models of technological adoption, measures of easiness are regarded as important determinants in a user's decision to acquire the device (Davis, 1989; Venkatesh et al., 2003; Venkatesh et al., 2012). Furthermore, a significant focus of research in social informatics (Dourish and Bell, 2007; Sawyer, 2005) and computer-human interfaces (Mun and Hwang, 2003; Paymans et al., 2004) focuses on attempting to make the experience of use as easy, convenient and intuitive as possible. Following these perspectives, an abundance of ease and convenience should be viewed as a positive in adopting technology. As Southerton (2014) suggests, these kinds of perspectives fail to completely grasp the context of use through a focus on rational and conscious

action[55]. Albert does not approach the adoption of technology with any preconceptions about his experience of use yet through the experience of use he finds it has a distracting and interfering potential because it is too easy to spend time on the device. These experiences lead to habits and gradually become cemented in his ethno-episteme, drawing in more time and attention than he would like. This is not a conscious choice to form a pattern of use where he multitasks and is constantly connected to his interface, but something that forms organically, making him critique his experiences. A sense of obligation grows through his experiences and habits. Part of Albert's critique and disquiet towards the Informatic Context rests on the social context of technological adoption and use. Technologies are innately social (Latour, 2005; Pinch and Bijker, 1987), and are not isolated examples of consumption or use but woven through everyday social practice. In continuing to use the interface, this is ratified. Combining Albert's demanding experience of use with the socio-technical assemblages of everyday life, however, means the use of technology may take up more time and attention than the actual social practice itself. The tablet creates a way of distracting Albert physically through its affordances of easiness. This serves to alter the relationship a user has to different social relationships, such as leisure. This theme, of how easiness modulates and shapes a user's engagements with aspects of the Informatic Context, is further developed in Chapter Six, where easiness and speed are identified as critical elements in shaping participants' learning response. In dealing with these negative aspects of adoption and use, Albert describes a need to manage his use and availability to technology. He achieves this through putting his device in another room, physically separating himself from the device (further discussion on controlling and limiting use can be found in Chapter Nine). He does not reject it outright, suggesting it still has a functional value and is a part of his everyday life. The adoption and use of the informatic has proven problematic for him however, prompting a critical reflection on his adoption.

[55] This also relates to Thrift (2004)who argues that there exists a technological unconscious, a technological substrate of society that rests below conscious awareness. Southerton (2014) suggests the same is true for individual users.

## Conclusion

The adoption of informatic technologies, and therefore also of the Informatic Context, illustrates how living as an Informatic Person places an individual at the intersections of micro, meso and macro-social issues. Each participant presents their own ethno-epistemes around understanding what adopting informatic technologies means as a part of their situated, everyday experiences. The three streams of adoption practices described here (active, passive and critical) reflect the nuances of these. There is thus no uniform experience to the joining or integration of the Informatic Context in everyday life. For example, a majority of discussion here focuses on interface devices, with some intersections of circulatory and abstractive practices. This indicates the spread and adoption of data technology is not seamless. Some relationships and practices are favoured over others, despite potential uses. This lack of seamlessness and friction is further reflected in Chapter Nine, where the Informatic Context challenges pre-existing normative and social values.

A key insight in this chapter is that relationships in the Informatic Context are more diverse than unmediated relationships. The adoption/obligation relationship is one that is both contextually situated yet stretched across different social contexts and levels, reflecting the diversity of entities that are exhibited by a relationship in the Informatic Context. To adopt informatic technology is inherently an embodied, situated and material act, as one must physically purchase an interface. Yet the adoption/obligation EEA discussed here illustrates how this relationship concerns a multitude of different actors and different social situations, some of which exist beyond the immediate scope of the actor. The scale of relationship in the Informatic Context changes. Distant others, such as telecommunications service providers or informatic platforms (like social media), are connected into the everyday relationships of Informatic Persons. The affordances of data allow mediated connections to be made to situated experiences, and contribute towards them. For example, a determination on the positives and negatives of use, and the subtle socio-technical pressures that

en/dis-courage use, are not solely defined by immediate others, but by external entities. Through mediated relationships they too can have an impact on the situated experience of adoption, alongside immediately co-present and intimate others (such as family members), and more proximate social commitments (such as work). The composition and quality of ordinary relationships in the Informatic Context therefore must be recognised as more varied and interconnected, with situated practices having links of great scale.

The reception of these relationships is also varied, as obligation is not automatically negative. Discussion on active adoption reveals the functional benefits that come with use, and how the obligation to use technology is a functional benefit. There are still, however, external demands and expectations of use for an individual. Factors external to the individual, such as the integration and widespread uptake of technology in the Informatic Context, place a slight pressure upon individuals to take up informatic technologies and be more involved in the Informatic Context. This is demonstrated in instances of passive adoption where use is subtly encouraged by external social contexts, such as one's work environment, despite a relatively neutral orientation towards technology. As critical adoption also describes, there are pressures beyond the individual's immediate contexts that can also be problematic here, such as the relationship with a telecommunications service provider.

Adoption, and the intersection of external pressures and actors on the embodied practices of an Informatic Person, illustrates the changing quality of social relationships in the Informatic Context. This foreshadows further relationships that are discussed in Chapters Seven and Eight. In Chapter Seven, risk relationships between individuals and broader socio-technical assemblages in the Informatic Context continues to reflect the connections to distant others, as continued use places individuals in potentially risky connection with external organisations. It also develops ideas around control, a theme that resonates with the idea of obligation that features in this chapter. Chapter Eight reflects on the positive qualities of the Informatic Context, and how mediated and diverse

relationships confer advantage. Adoption, while varied, cannot be equated to any uniform experience. This theme is repeated in Chapter Six, as discussion on learning behaviours reveals the differing motivations for learning about technology.

# Chapter 6 — Informatic Learning and Digital Skills

## Introduction

The adoption of informatic technologies does not assure one's success in the Informatic Context. Instead, an Informatic Person must develop digital skills, and learn how to use systems within the Informatic Context. Digital skills and learning behaviours are therefore a critical element in determining the kinds of socio-technical relationships a user might have. With the internet and digital systems so entrenched in everyday life, the possession of digital skills increases the social, cultural and economic capital of users (Hassani, 2006: 251). This also means that differences in skill levels can contribute to digital divides[56], with socio-technical opportunities determined by the ability of different groups to effectively use technology (Hargittai and Shafer, 2006: 433). Situated variables, such as the experiences and mindsets of users, are central to the kinds of skills developed (Hargittai and Hinnant, 2008; Hargittai, 2010), and to the kinds of inequalities that can come from use (DiMaggio et al., 2004a). Exploring learning and digital skills is therefore not just about how a technology is used, but also about how the learning experiences facilitate or prevent social relationships in the Informatic Context. This chapter explores the situated experiences of learning, examining how Informatic Persons learn and what perspectives they apply to their learning experiences, and what implications there are for an Informatic Person's socio-technical relationships.

For Informatic Persons, the dominant lens and perspective on learning is immediacy, and the desire for participants to have an easy and quick learning experience. These experiences are found to structure learning behaviours, and the overall ethno-episteme that participants develop towards

[56] Digital divides concerning ability and skill level are referred to as "second-level divides" by Hargittai (2003) and Van Dijck (2004), in comparison to "first-level" divides that focus on the availability and adoption of technology as defining of the divide (DiMaggio et al., 2004a). More discussion on this can be found in Chapters Two and Three.

digital skills. This is explored in detail in the first two sections, with emphasis placed on how immediacy structures learning experiences. The presence of immediacy has consequences however, which are raised in the final section on black boxes. The speed narrative is so powerful that it has the potential to limit and restrict the learning efforts of Informatic Persons. This is not viewed as a negative however, and is a voluntary choice of users. The positive experience of immediacy is such that immediacy is maintained wherever possible, such as through abandoning or limiting learning. Implications of this in terms of digital divides are raised in the conclusion.

## Immediacy or Easiness? Similarity and Differences in Learning Practice

In discussing their use of informatic technologies, participants highlight a novel element to their learning experiences, specifically that of immediacy. Ethno-epistemic assemblages around the cultivation of digital skills and learning practices are dominated by a focus on speed, easiness and effortlessness. According to Tomlinson (2007), notions of speed are a fundamental aspect of how personal and social realities are constructed. Alongside material and physical reality, social experiences and practices of time are fundamental to social reality (Southerton and Tomlinson, 2005: 236-7). Roger's example reflects immediacy, as he describes his learning as easy and self-directed:

> [How did I learn to use informatic technologies?] That's a good question. I think you learn through, by just doing it. And then you ask other people if you're having trouble with that. It's pretty easy though, you know? — **Roger**

Learning does not require sustained or substantial attention to detail, and is instead accomplished through practical use, something Roger describes as positive. While evoking a sense of acceleration, or more a more rapid passage of time (Rosa, 2003), Tomlinson positions immediacy as the removal of waiting, with the gap between request or desire, and the response, removed or "'written out" from the expectations and experiences of users (Tomlinson, 2007: 132). This recast immediacy as

more than the accelerated passage of material reality, instead being a socio-cultural mindset by which reality is understood without delay. This is present in Roger's statement, where learning is defined by easiness and the lack of effort required. Effortlessness is a primary characteristic of immediacy because it reflects the "conjuring away of effort" of an experience (Tomlinson, 2007: 80). What is valuable is no longer automatically associated with the expenditure of effort, but instead with what can be achieved without effort. By being accomplished through play, and through easy interactions, Roger's perspective on learning comes to reflect this. Implied in this is that the expenditure of time and energy is viewed negatively, and there is a focus on the "lightness of touch.... [and] effortless mediated delivery" (Tomlinson, 2007: 81). This is further developed in Marie's account:

> Taught myself [how to use informatic technologies]. So I borrowed [an old] LG [smartphone] and I got a little bit of instruction from my son-in-law. And then I just went on to fiddle around with it myself. — **Marie**

As Tomlinson (2007) argues, immediacy in the context of modern technology describes scenarios in which distance and delay have been replaced by proximity, with little gap between request and response (discussed in more detail below). Both Marie and Roger's learning experiences match this assertion, as their hands-on learning approaches (through play or fiddling) emphasise immediate and uninterrupted contact with their device, allowing quick and easy learning.

The suggestion that effortlessness is important to learning about informatic technologies is not new, and it is tempting to equate immediacy with previous discussion on easiness. For example, Shih and Venkatesh's (2004) user-adoption paradigm, which seeks to chart the variables that influence the use and diffusion of technology in different social contexts, identifies ease[57] as a determining variable in successful skills development. This is taken even further in earlier adoption models such

[57] They identify frustration as a variable negative associated with successful use, with ease being the opposite and therefore positive.

as the Technological Acceptance Model (TAM) in its first (Davis, 1989), second (Venkatesh and Davis, 2000) and third (Venkatesh and Bala, 2008) evolutions, and also later in the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2012). Although technology acceptance models do not focus on use and learning, they identified perceived easiness as a psychosocial variable that strongly influences users' decisions to adopt technology and, as Shih and Venkatesh (2004) advance, it is likely to be a positive factor in the development of usable skills. Elsewhere, further psychosocial variables such as self-efficacy, or the ability to self motivate and work in the face of challenges or external stimuli, are identified in a similar way to immediacy (Eastin and LaRose, 2000). These perspectives, however, understand easiness in the context of rational choice theories of learning, where individuals cognitively engage and evaluate learning, usage and adoption in a linear manner. This focus on the existence of a formal, linear logic to learning and digital skills does not completely capture the role of easiness in participants' learning experiences. Easiness is not a cognitive prerequisite that dictates whether a participant will or will not learn to use a device. It is a qualitative and experiential state that participants describe as central to their overall practice of learning, a state that is not exclusively about ease, but also intermixed with speed and rapidity.

Therefore previous measures of easiness employed by user-adoption or TAM models do not completely encompass the quality of user experiences. This is clear in this statement from Mandy:

> It's just, you don't have to learn [how to use informatic technologies], it's really just a click and those sorts of things. [...] You don't have to sit at your desk where your computer is. You don't have to plug the computer in and wait for it fire up and all those sorts of things. So it's just a switch on. It's "do you know if that payment has gone through yet?", "I'll have a look". It's nice and quick to do those sorts of things.
>
> — **Mandy**

Effortlessness is a contextual frame, encompassing learning and other behaviours around the interface. The importance of speed and easiness is not confined to specific acts of learning, but is something that is progressed through to culminate in successful use. For example, Mandy's later uses, such as using digital banking services, are deemed positive based on easiness and speed. Being mobile is also important, because activities can be completed away from a desktop computer more, and more rapidly. This reflects a fluidity and lightness to the experience of use that is not traditionally reflected in discussion on ease and learning.

As Sutherland (2013) states, at its simplest fluidity refers to the combinations of speed and mobility that permeate digital, late-modern societies. Fluidity is a popular sociological concept, employed by Bauman (2000; 2013), Urry (2000; 2003) and others (Castells, 2000c; Hardt and Negri, 2000; Lash, 2002; Shaviro, 2003) to highlight changes in social, material and political orders, emphasising states defined by movement and flow. For Tomlinson (2007: 80) however, the value lies more in terms of social interactivity, and how fluidity provides a "lightness of touch" to modern interactions (Tomlinson, 2007: 81). This is particularly clear in the "deftness of our interaction[s] with new communications technologies" (Tomlinson, 2007: 80), and how these interactions distance effort and labour from the interaction. Mandy's experience of seamlessness and fluidity is not easily captured by existing ideas of ease, such as those in rational choice theories. Easiness is not a cognitive variable in decision making, but a sought after quality that defines use, demonstrating the pervasiveness of immediacy in how Informatic Persons understand learning.

## Immediacy and Learning Resources

One way in which immediacy comes to shape how digital skills are learnt is in how resources for learning are selected, or rejected, based on immediacy. Immediacy appears to structure and shape the learning approaches and practices that participants are selecting, influencing how digital skills evolve. Effectiveness and knowledgeability are important but secondary. This is apparent in

discussion on the use of manuals or documentation as a part of learning to use informatic technologies. Instead of being authoritative, helpful or insightful sources of information, manuals are negatively evaluated. This is highlighted by Eliza:

> The manual is I'd say [is] four centimetres thick [...] the language in the manual, it doesn't even relate to what's going on, on the phone. The disadvantage was I was learning to use it at my house. So I would sometimes have to go outside and chase around the satellites [to get reception on her device]. But it doesn't matter. It's not intuitive at all. Which is why it [the phone] is the problem it is. I've sat down and used the new iPhone and new iPad and have been able to use it, even though it's not mine, within 15 seconds. And it's just a whole different world. — **Eliza**

The intuitive use of informatic technologies (a smartphone and tablet) is superior and more desirable than reference material or documentation because there is less time or effort expended in accomplishing learning. This demonstrates the importance of proximity, a crucial element of immediacy, in Eliza's learning experience. The ultimate goal of acceleration and speed in the context of immediacy is "'clos[ing] of the gap' separating human desire from its attainment" (Tomlinson, 2007: 90), with immediacy satisfying conditions and circumstances where there is no gap between desire and request. Action is light and effortless, without distance or delay. This is also described by Virilio (1992) as being a mutation of the "law of proximity", which represents a principle of least effort or action. He applies this in relation to technologies, arguing that there has been a reduction or compression of the distance between technology and its associated actions. For Tomlinson this is expressed at a cultural level through everyday practices with technology, particularly through digital media and consumption where "we are offered the impression that new comforts, conveniences and refinements will flow independently of our individual efforts; that little separates desires and its satisfactions" (Tomlinson, 2007: 91). Referring to documentation contradicts proximity and immediacy in Eliza's learning experience, and increases the distance between the desires of the user

(to learn the device) and the response (successful use). This makes learning less easy and immediate for Eliza, creating negative conditions and connotations around learning.

The lack of proximity, and therefore immediacy, in the use of manuals is therefore why they are rejected by participants in favour of other measures. This is illustrated by Albert, who rejects such texts and resources as unnecessary:

> You just use it [to learn how to use a device]. Instruction manuals are not needed. [Informatic technologies] are pretty intuitive, yeah there are a few things that I guess you do need to know, when you maybe start using them, but I think I'd be reasonably confident in picking up a particular [technology], in fact I have, I have an Android-based pad for one of the bits of lab[oratory] equipment around here, and I hadn't used one of those before but it was pretty easy to get going. I don't think I had to look up anything . — **Albert**

Even when devices are entirely new, manuals or reference materials are not required or needed. Instead it is immediate and proximate behaviours of learning that are favoured, such as hands-on learning, what Eliza and Albert refer to as "intuition". While manuals often have warranty or safety information relevant to a user, they fail as an attractive learning measure because they increase the gap between participants' wishes and desires. They divert users away from the devices that they ultimately believe will be best learnt through use. This observation is interesting, as manuals' one purpose is to reduce the potential gap between use and non-use. In the case of mobile technologies, Honold (1999) indicates that some populations and user groups view such manuals as important and helpful in learning technology. As Woolgar (1991) explores, manuals are a critical aspect of designing usable computer technology, "intended to enable the operation/reading of a core text" (Woolgar, 1991: 81), with the core text being the technological system in question. Manuals are meant to provide a clear statement on how technology should operate and behave, while also assuming how

users should behave around it. However, Mossberger, Tolbert and Stansbury (2003) also indicate that from a user perspective, manuals and digital resources tend to be less desirable compared to hands-on and face-to-face approaches. This is reflected by participants' preference for hands-on and play-based approaches, as they are the most immediate in nature. Additionally, Brown and Duguid (2000) suggest that written documentation and manuals are remarkably inefficient means of conveying information. An explanation for this can be found through immediacy, as manuals only serve to delay and distance a user from the successful use that hands-on learning provides.

**Digital Resources**

This does not mean, however, that all external resources are rejected. Several participants do indicate a willingness to seek help and research informatic technologies using external resources, although these are chosen because of their immediacy and easiness. In this way, immediate and proximate methods of learning are perpetuated. The use of Google as a search engine is a good example of this. Google is the only search engine service mentioned by participants. As Marie states:

> What I love most of all, is having that source of information available in my hand. At all times, wherever I am, I can look stuff up, so it's that access to information for me [that is important...], huge, huge user of Google [...] it is very important because as I said, my head is so [full] with stuff to remember, that being able to deal with something straight away is a huge benefit, not having to leave it and having to remember about it later on. — **Marie**

Google provides a range of abstractive functions that are convenient and powerful for users, particularly around information retrieval. Whenever information access is required, such as when learning about technology, Google is readily available to provide an answer immediately. Commercial competitors such as Yahoo, or alternatives such as Wolfram-Alpha, are not used. This

aligns with previous research on the significance of Google for digital skills. van Deursen and van Dijk (2009) identify Google as the preferred means of sorting information online, with respondents in their study preferring it over government-specific websites. Furthermore, the use of search engines is a frequently used measure of digital skills, indicating increased levels of comprehension and ability (Pearce and Rice, 2013; van Deursen and van Dijk, 2011; Zillien and Hargittai, 2009).

Part of the popularity of Google lies with how this search engine conforms to immediacy and the logic of proximity, something Marie begins to indicate. While hands-on and practical learning is still desirable, Gavin acknowledges that the internet can be very helpful:

> Don't know really [how I learnt to use informatic technologies], I just played with it, [to] get it to do what I wanted it to do. Obviously there are lots of help things on the internet, how do I, I mean first thing I remember doing was losing the clock. Shit. So you just Google "how do I get my clock back on [my interface device]", and it tells you straight away, after you've done a few stuff ups like that you learn.
>
> — **Gavin**

When hands-on learning fails, or results in a problem (such as losing the clock function from his device), Gavin searches for an answer on Google. It is not surprising that the internet is a desirable learning platform for participants. Search engines like Google represent a large percentage of daily internet traffic (Geere, 2013)**,** with Google in particular being the face of modern information retrieval and research (Mostafa, 2005)**.** The prominence of Google in everyday life as the go-to source for any query has led to the rise of the so-called "Google Effect" (Sparrow et al., 2011)**,** with physiological change in memory linked to the habitual use of the platform. In using Google or any search engine, information is not just retrieved. Instead, as Van Dijck (2010) argues, it is co-produced. Google itself is a large socio-technical assemblage of sometimes competing interests (as explored in Chapter Seven, Google's interests extend into commercial surveillance amongst other

things). By using a searching engine, the situated experience of learning is scaled up into this assemblage, altering the relationship. For example, while search engines contribute to the answers they provide, these answers are determined by algorithms (Introna and Nissenbaum, 2000; Pan et al., 2007) that filter and tailor results based on previous searches and contextual information**.** A user's relationship with Google actively shapes the information and learning practices into which it is drawn. This shaping does not end with the information provided, but also affects the entire context in which information is retrieved and understood, and must be considered holistically (Rieger, 2009). The contribution of Google and other search engines for Informatic Persons is not in the information itself (although this is crucial), but the experience of information retrieval. As Eliza illustrates, Google is helpful and desirable because it is convenient and matches with the logic of immediacy:

> Everything I want to know is on the net. Because I don't recall things off my brain anymore. When in doubt, Google it. Google an address. Google a phone number. Google a shop. Google a [product and ask], can I buy this cheaper someplace else. Can I buy it cheaper online if I find it online. Where can I get this book? I've just heard about this book on the radio. Oh, and I love the convenience! — **Eliza**

Google hastens what Tomlinson (2007: 125) calls the "speed of appropriation", reducing the gap between demand and response. This is evidenced in Eliza and Gavin's statements, in how acts of consumption and information retrieval are so easily accomplished. Google's abilities with information are particularly significant given the amount of information Google can handle, demonstrating what Tomlinson (2007: 135) calls the impatient and immoderate nature of technology. Technologies are designed to provide instant delivery and hyper-abundance and, by affording this, the centrality of immediacy is conditioned into a user's expectations. Eliza, Gavin and Marie all present reflections that emphasise this, with speed a normalised and positive aspect of their use of Google, and important in how they gather information and learn.

This expectation is further evidenced in how Google has come to replace other forms of reference and learning, identified by Mandy. Although not specifically related to learning about informatic technology, Mandy refers to Google in a broader sense of learning, and how she interrogates and understands the world around her:

> The other thing that it [Google] is really convenient for, it's really quite bizarre that we do it, [it] is probably said something earlier about it as well, someone will use some obscure word on television and within seconds I've put it into Google dictionary to find out what in the world this meant and did they use it in the right place. Those sorts of things is what we tend, you know I mean, it sits there and we use it. It's just sitting there, where we might be reading or watching television or something like that and we just look it up. So it's actually taken the place of [a dictionary], I don't have a dictionary on my bookshelf at this point in time. I have a lot of books in storage, that's one of them. — **Mandy**

In answering a query about an unknown word, a paper dictionary would provide a similar answer to Google. However, Google is the preferred means of finding this answer for Mandy. She links this to its proximity to the query itself. Informatic services like Google are close to hand, but can be easily used in the same moment as the question occurs, blended into the act of recreation. This links into the previous discussion of fluidity made above (see Chapter Three for more on this), with no gap or distance between the question and learning the answer.

**Warm Experts and Personal Networks**

Social and personal networks represent another kind of learning resource that some participants use, one that continues to reinforce immediacy as important. As Roger and Marie's earlier comments (from page 124 onward) illustrate, although they intend to learn through hands-on

means, personal networks often assist in this. Personal relationships and networks have been described by De Haan (2004), Robinson et al. (2003) and DiMaggio and Hargittai (2001) as an important consideration in quantitative studies of digital skills. Using multivariate analyses, Robinson et al. (2003) notes that greater numbers of social relationships, and more social contact, are positively associated with other measures (such as education, income and location) in indicating the possession of digital skills. While highlighting the importance of social relationships, the specific relationships used to develop digital skills are not explored, nor what experiences are like for users.

Insights from participants here suggest that the networks and relationships adopted in learning are not randomly selected. Instead, they are constructed to maintain convenience, immediacy and easiness in their learning practices. This is illustrated in Naomi's experiences of learning how to set up and use an interface device in the context of her workplace:

> [...] thinking back [to when I first started using informatic technologies and systems], I was at [another institution] before and we all got [interface devices], and you had to work out how to put them on the wireless network and things. So the[re are] settings which I'm pretty okay with, but all those things that are in Settings and the concept of Settings and the fact that things might be in Settings before, I can remember before this we would look for someone [and say] "oh [co-worker] you've done this"! Everyone sort of shared bits so we did, there was quite a bit of peer learning going on with new users because a lot of us had this new device at the same time or you'd sit in meetings and then somebody would double click on the button that means you can get things from them. Somebody first discovered that and the rest of us went "Oh!". — **Naomi**

Naomi identifies how personal relationships, such as between work colleagues in a meeting, can act as "warm experts" to further learning. Bakardjieva and Smith (2001) conceptualise "warm experts"

as people who can be mobilised by users to provide non-formal expertise to aid their use and integration of technology. The very nature of warm experts also closely reflects immediacy. Drawing on pre-existing relationships means a reduced cost to the interaction in terms of effort, as warm experts are in close proximity to a user, and respect and understand their context. This makes learning easier, and also provides avenues for continued support based on the relationship (Lehtonen, 2003: 11) as feedback can be quickly given. This closeness and easiness for the user makes warm experts more desirable than formal expertise such as retailers and services providers (Stewart, 2007: 556) as outside experts do not necessarily understand and respect a user's context (Lehtonen, 2003). Deference to warm experts matches the logic of immediacy, and the continuing desire to structure learning are easiness and speed.

The warm experts that some participants describe often come in the form of family members. This is demonstrated in the following statement from Melissa:

> So you know we [my partner and I] picked on each other with how we would adapt [and learn to use new] devices, and taught each other tips and tricks because he [my partner] will get onto forums and learn about more of the technical side of the device, such as he worked out from those and told me that when you double click your operating button you can close down what's running in the background. I never would have discovered that I don't think without someone telling me.
>
> — **Melissa**

This example demonstrates how warm expertise is practically applied, maintaining Informatic Persons' immediate learning experiences. Melissa and her partner act as warm experts to each other, translating and sharing different sources of information (such as online forums) to improve how they use technology. This helps maintain the immediacy of learning as it avoids the irrelevant or unhelpful information that comes with the hyper-abundance of data on the internet, what has been

called infoglut by Andrejevic (2013) and data smog by Shenk (1997). It is also a fluid way of learning that reflects the lightness of touch that immediacy entails (Tomlinson, 2007: 81). The learning process is informal and organic, drawing on the established qualities of the relationship (such as her partner's "technical" knowledge) to effect learning that is immediate and easy for an Informatic Person.

**Age and Learning**

A novel and distinctive variation on warm experts and using personal networks for learning is present around young people. From the perspective of older participants (over the age of 50) a relationship between knowledgeability and age is present, as John (aged in his 50s) suggests:

> **John —** Learning [to use new information technologies] every few [years, like] when I change the software or like transition from the Android HTC to the iPhone, I find it a pain to start them off from scratch. "Which button does that? Where do I find that?" [...] whatever, for me it's a pain whereas the young guys seem to think it's part of the challenge to sort it out, find where the menu is. I'd rather know where it is right from scratch. When I pick it up, it's obvious where to go for the thing. But each machine and brand is quite different.
>
> **Interviewer —** So you're not really looking for a challenge then that the younger people describe?
>
> **John —** No. I want to work effectively and efficiently immediately I've got the device, but that can't happen because the device or its software changes so quickly.

Young people are often portrayed as having a specific affinity and capacity towards digital and informatic technologies that makes them a more knowledgeable and therefore desirable warm

expert. This is particularly developed in the so-called “Digital Natives” hypothesis (for example see Bennett et al., 2008; Palfrey and Gasser, 2013; Prensky, 2001b; Wareham et al., 2009). This hypothesis argues that because of the context of their birth, young people are native users of and experts with regard to information technologies, and have been able to develop digital skills of greater quality and variety than their elders. Older generations, no matter how knowledgeable, are merely “Digital Immigrants”, and lack the same degree of ability and comprehension of technology compared to younger users. John’s statement begins to build on this digital natives idea, comparing his own frustration of learning to use technology every two years to the enthusiasm which his younger colleagues display. Important in this comparison is the speed of learning. John’s irritation with learning technology comes from the lack of immediacy in learning. Technologies must “work effectively and efficiently immediately”, thus placing a negative value on the learning experience that takes time and energy. Thus there is the suggestion that for digitally native generations, learning is more rapid and therefore more positive. This further associates speed with positive learning practices, and as beneficial to the development of digital skills.

From the perspective of digital natives themselves, the existence of some special affinity with technology finds some moderate support, as Norman (aged in his late 20s) illustrates:

> [..] most people my age and younger, we’re fairly comfortable using the internet in general, in particular relying on information pretty heavily, and easy access to it, [... later] I mean we grew up using computers in our family. Not so much consoles, like perhaps some other families, but we had an Amiga 500 when I was very young and that moved into various PCs. When I was in high school and uni[versity], I used computers pretty heavily, so yeah, I’m pretty familiar with the technology. And I’ve used the internet since the mid 90s and so it sort of flows on naturally I guess.
>
> — **Norman**

With a history of using informatic technologies, from early devices through to recent innovations, Norman affirms the belief that young people are digital natives. He describes a familiarity with and acceptance of informatic technology, but does not emphasise his generation as having any special characteristics or affinities with technology as John does. Any ability or comfort with technology simply appears to be from their presence and integration in everyday life, through his childhood and educational circumstances, a point supported by Prensky (2001a). While remaining enduringly popular in the public and academic conscious (Rosen, 2010; Thomas, 2011), empirical evidence supporting digital natives and their superior digital skills is lacking. As Hargittai (2010) argues, considerable variation still exists amongst young people's level of digital skills, with age or generation not being a guarantee of ability or use, a point van Deursen and van Dijk (2011; Van Deursen et al., 2011) also support. The relationship between age and digital skills is therefore indeterminate and complicated in theoretical and empirical literature (Gui and Argentin, 2011; Margaryan, 2011). While tenuous, the digital native idea persists, and features strongly in some accounts of learning.

As Victoria illustrates below, based on their habituation to technology, young people can act as warm experts and provide a source of immediate learning:

> I have a teenager daughter. I don't need to know anything. I just ask her. She knows everything [...] She uses it a lot more than I do, but she's careful with it though, she doesn't put too much stuff out there. She's a little bit cautious with it. But she just knows like, every new little app[lication] that comes up or a new way of doing something she'll have that under her belt, so if I need to know anything, I'll get told everything. I'll say how do you do that. — **Victoria**

Victoria combines the warm expert approach to learning with the digital natives narrative. She emphasises her own ignorance in the face of technology, and defers to her teenage daughter to

educate her on informatic technologies. While the academic evidence does not necessarily support Victoria's implicit link between age and expertise, using her daughter as a learning tool makes sense in the context of immediacy. Victoria and her daughter are often co-present (as her daughter still lives with her), meaning that she is proximate and immediately available to aid in learning behaviours. The pre-existing familial relationship also means a knowledge of the context that can aid in learning, as technology practices becomes an aspect of the domestic life (Silverstone et al., 1992). While young people are considered as knowledgeable in the use of informatic technologies, they are also however framed as risky (boyd, 2014; Kelly, 2003), or in need of monitoring and control (Fisk, 2014; Taylor, 2013). This complicates their warm expert status as, while they may provide technically sound knowledge, their contributions may be viewed as inappropriate or lacking in judgment. Although not giving her specific age, at the time of the interview Victoria identifies her daughter as being close to the age of 18. This places her daughter in an age bracket that is subject to numerous claims about the appropriateness of their digital conduct (boyd, 2014; Cassell and Cramer, 2007; Livingstone et al., 2012; Tynes, 2007). However, these potential concerns are headed off by Victoria, as she also describes her daughter's use as "cautious" and "careful". While acting to support her daughter's abilities and judgment here, such a defusing of risks also means that drawing upon her daughter's support is more justifiable in the context of potential risks. This illustrates the importance and value that immediacy has to learning partners, as concerns are sidestepped in favour of convenience and ease.

## Consequences of Immediacy: Blackboxing and Learning

While it is clear that immediacy is central to participants' ethno-epistemes around learning and developing digital skills, immediacy is not without its consequences. The logic of immediacy contributes to the creation of what Latour (1991; 1993; 1996a; 2005) and others (Callon, 1986; Law and Callon, 1988; Law, 2009; Pinch, 1992) have described as black boxes. Discussed in more detail

below, a black box refers to something that is understood only on the basis of its inputs and outputs, with its internal workings becoming invisible and forgotten. Applied to Informatic Persons and the learning of digital skills, the idea of the black box can capture how immediacy creates voluntary limits and restrictions to what Informatic Persons believe is important to their learning. As will be discussed below, the pre-occupation that participants have within maintaining a learning experience that is immediate means that the Informatic Context is often blackboxed. Immediacy may be a desirable quality to the experience of learning, but the potential consequence is that learning and understanding informatic technology becomes inherently limited and restricted to maintain this immediacy.

The term black box is commonly used in social science disciplines concerning science and technology to describe how scientific and technological artefacts are presented in the social world (Pinch and Bijker, 1987)[58]. Latour describes the black box as "scientific and technical work [that] is made invisible by its own success. When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity" (Latour, 1999: 30) . This highlights a number of significant points. Firstly, that the internal workings of science and technology are often obscured from the social and often not linked to social patterns and networks, despite ample evidence to the contrary (Bijker, 2010). Secondly, that the ability of the institutions of science and technology to achieve is highlighted, while the actual process(es) by which this occurs are hidden. Thus the success of science and technology comes to be viewed not as a result of the complexities of socio-technical work, which in many cases is highly contestable (Latour and Woolgar, 1979; Latour, 1992; 1996a) and largely invisible as long as all systems function correctly (Callon, 1987; Latour, 1996a). The complexities of a socio-technical system are therefore obscured, limiting the understanding of the system.

[58] The term is borrowed from engineering where a black box is a device or system that can be understood solely in terms of inputs and outputs, with internal workings invisible, ignored or hidden (Winner, 1993)

**Blackboxing through Learning Practice**

The black box of informatic technology is linked to immediacy, and the emphasis on proximity and speed as expected outputs. As noted previously, the learning strategies that participants describe favour hands-on and practical forms of learning because of their immediate response. As Marie demonstrates, the same focus also contributes to the creation of black boxes:

> And in the end I just didn't bother [learning more about informatic technologies] because I thought, [informatic technologies are] doing everything I want it to do. Yes I'm sure there are other nice features, but to be perfectly honest I couldn't care less. As I need things, as I discover that I might be able to do something, I will explore those and figure out how to use them. — **Marie**

Marie focuses on learning those elements and features that she immediately requires to practically use informatic technology. Although she does not specify these functions, they might be considered as examples of inputs and outputs in the formation of a black box. Marie has desired features and responses she requires from informatic technology, these desires and her interactions to the device can be thought of as inputs. The successful completion of these interactions and the accomplishment of a function can be thought of as outputs. This cycle of desire/input and function/output is completed easily and without complication, and Marie limits her use based on her needs, thus she limits the skills she learns around her device. She acknowledges the potential possibilities and ranges of features that informatic technologies hold, but does not wish to explore or understand these further. The only thing that might prompt her learning is a requirement to "do something" practical. This emphasis on practical use as the defining element to limiting learning is also raised by Gavin:

> [I ] don't know really [much about informatic technology], I just played with it, get it to do what I wanted it to do. Obviously there are lots of help things on the internet [...] but I'm sure there are things [I am] doing on this [device] that are not as efficient as they could be. And I know I'm not really compliant [with this] but I can't really be [bothered]. It's not that critical. I know if I open app[lications], I don't close them properly. So I have 10 app[lications] running in the background and haven't worked out how to stop them without turning off the phone. — **Gavin**

While there is a focus on immediate functions and the practice of use, even immediacy has limits. Hands-on learning continues to be important, as Gavin describes how he "played" with technology to make it work. He also acknowledges, however, that his learning is incomplete and potentially inefficient. Gavin therefore acknowledges the limits of immediacy, and that better approaches to technology do exist. This does not change his practice however, because as long as his immediate needs are met he has no interest in further understanding technology or acquiring new skills. Even if there is a more immediate and effective solution to a problem (such as finding a way to close multiple applications), the focus on immediacy limits his desire to learn about the Informatic Context to inputs and outputs. Further learning would require opening the black box, which is not essential for functioning, or beneficial for maintaining his immediacy.

Although blackboxing informatic technologies potentially limits the contributions these technologies make to participants' lives, this limitation is acceptable, as long as immediacy is maintained. As discussed later in Chapter Eight, the capacities of informatic technologies to advance and further the personal interests of Informatic Persons is regarded as one of the most valuable and desirable features of these systems. From social media and networking to multimedia capture and playback, informatic technologies make valuable contributions to participants' lives. These kinds of interactions also represent fields in which new divides and barriers to equal use are emerging (Blank, 2013; Hargittai and Shaw, 2015; Schradie, 2011; Vie, 2008). One means by which barriers may be

forming is because users do not wish to understand them, with several participants indicating a willingness to blackbox new technologies in favour of only the most immediate and salient functions to them. As John describes:

> [My learning philosophy is] use the bits that I use often, learn them as fast as I can and don't worry about the things I don't know about it. So I probably use only a very small capacity of the device, know how to take a photograph, know how to send the photograph, know how to find the Short Message Service, know how to find the messages, how to call back, all of the basic functional stuff, get that over and done with quickly. Learn that stuff and don't worry about, "Oh, can it do that as well? Oh, amazing! That's fantastic, isn't it? I might need that sometime." Forget about it. — **John**

This quote highlights the continuing entwinement of immediacy and easiness with hands-on learning. Only those functions most immediately available and needed to get by in life are learnt. They are also learnt as fast as possible, with extra potential activities rejected, even if users might have some unintended need for it. Immediacy not only dominates John's learning ethno-episteme, but the prospect of blackboxing and reduced potential functionality is not viewed negatively. This is interesting given that the prospect of missing out on something through technology is usually viewed in a negative light. Psychological and sociological studies have highlighted a "fear of missing out" or FOMO (Clayton et al., 2015; Przybylski et al., 2013; Turkle, 2008a) as a common narrative around technology. Although this narrative emphasises concerns about losing out on social contact that is technologically mediated, and not technical functionality, it does reflect a desire to be achieving the maximum from one's relationships around technology. This does not appear to apply here however, with new abilities and functionalities providing insufficient motivation for participants to open the black box of technology and further develop their digital skills.

In some instances, it is even desirable to select, use and learn about informatic technologies on the basis that they will not be so fully featured. This is described by Kenneth, who contextualises his learning and usage of technology in a way that frames limitations as positive:

> I don't see a need for [a great variety of functions]. I don't hate [my smartphone]. I don't love it. I just don't. It's another bell and whistle on something that I basically need for phone calls. It's a clever dumb phone. Like I said, I do want an Einstein phone but I can't drive it if it's smarter than I am. I didn't want a dumb phone. This is a smartphone, but a semi-intelligent smartphone. How about that? I still use it basically for phone calls, emails and text messaging, and all these other things are a bit of a brave new world. — **Kenneth**

Kenneth's account is slightly different to other participants' accounts here in that it references ideas of adoption (discussed earlier in Chapter Five) and not learning specifically. The idea of immediacy is also rather limited in this statement. What is clear here is the idea of the black box. Kenneth does not what to open up and explore the possibilities of advanced informatic technologies. He would instead prefer a device that is limited to certain uses, specific inputs and outputs. The blackboxing of technology may be identified as problematic to those who analyse the sociological significance of technology in society (Pinch, 1992; Winner, 1993) but for individual users it can actually be a positive. This positivity can be related back to immediacy and the desire for easiness over all aspects of use. This is emphasised by Mark, in a discussion between the value of potential functionalities and the intuitiveness (or easiness) of learning technology:

> **Interviewer —** So, in that choice between, honestly, if there's certain functions that you want in your mobile device, and intuition, what wins out do you think? The ease of use, or the functions?

**Mark —** Ease of use. Every time.

**Interviewer —** So, even if a device was more functional, but you had to tinker or fiddle a bit?

**Mark —** It's not worth the effort. Simple as that!

Immediacy is clearly identified in this account as being the primary value by which the learning and skills around informatic technology are judged. Learning to develop new functionalities through opening up the black box, what is described as "tinkering or fiddl[ing]" is flatly rejected as being too much effort. As Tomlinson (2007) has stated, immediacy is also a reference towards lightness and fluidity, and of effortless interactions and results. Mark's statements clearly demonstrate how strongly the desire for effortlessness in learning practices limits further learning that might open the black box.

**Gender and Blackboxing**

A novel and significant presentation of blackboxing and learning is demonstrated by some female participants, drawing upon their gender in understanding and limiting their learning practices. Their EEAs around learning and blackboxing continue to cohere with the logic of immediacy in that there is a focus on the proximate inputs/outputs of informatic technology. They also, however, reflect on their relationship and attitude to informatic technologies as being influenced by gender, with their femininity associated with limitations in learning. Previous discussion on the relationship between gender and digital skills has revealed some differences between male and female users. For example, Wasserman and Richmond-Abbott (2005) found that female users were found to be more likely to use communicative services (for example phone and internet, but excluding online chat services) than men. However, Helsper (2010) is quick to emphasise that any differences must be further contextualised in relation to gender across the life course, with different ages and life

circumstances (work and education for example) also having a significant impact. This is further emphasised by Kennedy et al. (2003) and Green (2000) who note the importance of work (domestic and/or paid) in technological usage and beliefs. Applying this apparent division to learning and digital skills, this has helped perpetuate the idea that women have a lower level of digital skills in comparison to men (Cooper, 2006; Wasserman and Richmond-Abbott, 2005). As Hargittai and Shafer (2006), van Deursen and van Dijk (2015) and Gui and Argentin (2011) suggest however, differences in skill are either small or practically non-existent. What instead occurs is the creation of a perception by women that they are less skilled, which may negatively influence self-report measures (Correa, 2010; Hargittai and Shafer, 2006). As Hargittai and Shaw (2015) note, this can have significant effects on digital behaviours in the Web 2.0 paradigm, such as in contributing to large-scale online platforms like Wikipedia. Continuing to excavate and develop how these attitudes play out in relation to other digital technologies is of continuing importance.

For a group of three female participants, a gendered narrative around their learning and digital skills practices is clearly apparent. As Victoria articulates:

> Because I see [interfaces and informatic technologies] as a device, and I don't need to know how it works. It's doing a job for me. I think it's a fairly female attitude. It's a tool. That's how I see it. I don't need to know how the tool works. I don't need to know how my blender works, I don't need to know how my oven works, they just work. I get upset however when they don't work. Same with my phone and my iPad. They work. And they service me. — **Victoria**

Previously raised themes of immediacy, blackboxing and easiness remain strong in Victoria's desire to not learn further about informatic technology. This is developed through analogues to non-digital technologies or "tools" such as blenders and ovens, uncomplicated systems defined only by their capacity (or output). Informatic systems are viewed in the same light as these tools in that there is

no need to further understand them, so long as they continue to work. This treatment of immediacy and blackboxing is specifically framed in relation to gender, a consequence of a "fairly female attitude" towards technology, explicitly framing digital technologies in the context of gender. This draws upon the negative perceptions that female users sometimes have of their digital skills (Hargittai and Shafer, 2006), with Victoria dismissing her own abilities and trying to justify her lack of knowledge. This reflects a gendered relationship with technology, where disengagement is justifiable and expected for her. This is further developed by Wajcman (1991; 2013), Harding (1986) and Cowan (Cowan, 1976; 1987) who identify the intersection between technology, power and gender, and how technology can directly contribute to gender roles and inequalities, indicating that technology itself is gendered. Due to the historical and socio-cultural association of men to technology (Cockburn, 1985; Cockburn and Ormrod, 1993), the idea that Victoria would want to deeply explore and understand technology is not coherent with being a woman. Instead, her learning aligns with an interest in technology that only extends to their function, and not any innate interest or enjoyment in the technology itself (Faulkner, 2000: 93). Even the examples that Victoria provides in her analogue, of comparing ovens and blenders as tools that are similar to informatic technologies, reflects the association of these specific technologies to female gender roles around cooking, cleaning and childcare (Cowan, 1987). The blackboxing narrative, and the limitations on skills and learning, are therefore reinforced re-enforced and justified with an EEA built on gender stereotypes.

Victoria is the most obvious in her belief in the gendering of the learning/blackboxing/immediacy narrative, but other participants also construct an ethno-episteme that more subtly connects to these elements. For example, Lynda reflects upon her abilities and interest towards technology in how she learns, and subsequently limits, technologies:

> I always feel quite naive when it comes to technology. I think whether I need something, or when something really serves a purpose for me, I'll look at [the

> technology] wholly and solely, and make sure I'm using it to its full capacity. Generally, as I said. [However] it's kind of snatch and grab, whatever element you need and you just use those elements. But yeah, there's a general level of disinterest for me. I think that's just a silly kind of, blinkerism that I go — [Lynda is] not good at technology, therefore [Lynda] is not good at technology — a self-fulfilling prophecy. Exactly. And perhaps if I open my eyes a bit more to it, then there, it would be better off for me. — **Lynda**

Lynda's "snatch and grab" approach to learning continues the focus on immediacy and the need for rapidity, reflecting lack of effort or expenditure in learning to use technology. Through the use of subtly gendered references towards technology, such as having a "naive" relationship with technology, her learning reflecting a "self-fulfilling prophecy" and possessing a "blinkerism" towards technology, Lynda focuses on the proximate and easy elements of use and learning. While accepting technology as being blackboxed, and the potential easiness this provides, there is also a degree of ambivalence and confliction, with Lynda reflecting that being more engaged with technology may be personally beneficial. Hargittai and Shafer (2006) note that it is the self-perceptions of female users, and not any practical lack of skills, that impedes learning, something Lynda notes in her own desire to blackboxing the technology. The idea of naivety towards understanding technology is a common feature in gender stereotypes. As noted above with Victoria, this reflects the masculine nature of information technology, and that because technology is associated with masculinity, it is difficult or undesirable for women to engage or enjoy technology (Faulkner, 2000). This is also subtly revealed in Julia's comment, as she continues to develop ambivalence towards informatic technology, building the black box:

> This is the problem, I'm incredibly untechnical. I just learn, only learn what I need to know and then that's all I understand. — **Julia**

The description of herself as “incredibly untechnical” resonates with previous discussion on the gendering of technology, and associating women with less ability or capacity towards technology, whether through innate qualities (a position Wajcman (1991) describes as essentialism) or through the social construction of the technology and gender roles (MacKenzie and Wajcman, 1999; Wajcman, 2010). It is also a further indication of the negative perceptions that females users have on their digital abilities. This position on learning is further elaborated in discussing the relationship to changing technological systems:

> Yes. I hate it when things change. I really hate that. Cause, as I’ve said, I only learn one way to do things. That’s the only way I want to know. I don’t want to have to learn a whole new thing. As I said I’ve got this tablet, it’s a convertible tablet laptop for my birthday today, part of me is dreading learning that. — **Julia**

Julia’s description of her learning emphasises the creation of the black box as a symptom of her lack of belief in technology, as this produces the easiest outcome for learning, a process she dreads. Like Lynda, Julia’s situation is reflective of the idea of a self-fulfilling prophecy, a perpetuation of the gendering of technology through her EEA towards it. By believing herself to be untechnical, she has come to dread learning and thus limits herself. As she illustrates in a subsequent statement, she is perfectly able to use informatic technologies, but just has a persistent negativity towards it:

> I had six weeks off work recently cause I was sick. And my password [to my workplace email account] must have run out to access my email, so when suddenly, I couldn’t access my email, it was like, I’ve got no way of solving this problem. I have no idea what to do. And I actually worked it out. — **Julia**

In instances where she has been pushed to engage with informatic technology, and go beyond simple inputs and output to engage with the black box, Julia finds herself entirely capable of doing

so. There is no essential deficit in her abilities, but an unfortunately yet persistent gender stereotype that frames and encourages blackboxing. As Hargittai and Shafer (2006) and van Deursen and van Dijk (2015) raise, the practical difference in digital skills between genders are negligible and do not reflect the negative self-belief that female users have. The mere presence of the beliefs is enough that potential behaviours and patterns of uses are altered, as demonstrated here in the intersections of learning and blackboxing. Immediacy still exists as a trait and experience that participants desire, but this is entwined with a narrative of gender that for these particular users is potentially stronger in their learning EEAs than immediacy alone.

## Conclusion

For Informatic Persons, learning is dominated by ideas of immediacy. The EEAs explored in this chapter illustrate how easiness, speed and effortlessness structure learning practices in the Informatic Context. Immediacy is found not just to be a positive consequence, or a desirable variable in decision making, but a powerful experiential state that shapes how learning is approached and enacted. This is most clear in how immediacy influences what learning resources are employed, with the importance of warm expertise (particularly young people and close personal networks) and digital services (such as Google) predicated on their coherence to immediacy. By providing ease and effortlessness learning, these practices become central to how Informatic Persons learn about the Informatic Context (particularly their interface devices), and contribute to the digital skills a user has in everyday life.

The importance of easiness and speed is not particularly surprising with technology, but its implications for digital skills are significant. A user's level of digital literacy is an element of recent discussion around digital divides, meaning that individual learning practices connect an Informatic Person into much larger socio-technical debates. This is also raised in the previous chapter on adoption, where adoption behaviours are subject to external pressures from different socio-

technical relationships. Participants' learning relationships can have significant variations in scale, with both immediate and co-present others (warm experts for instance), and much more distance and abstract entities (such as a search engine like Google), being able to effect their situated experiences. In this case of learning behaviours, the dynamic is less about external pressure being placed upon the Informatic Person[59], but instead more a reflection on how the situated context of users (such as need for immediacy) can shape what kinds of relationships are forged (near or far) in the Informatic Context. Individual, immediate and co-present contexts are less separate from distant, macro-social trends, and these are woven through each other via technology.

This interweaving also illustrates how individual learning practices have broader socio-technical consequences. The development of the black box narrative as a consequence of immediacy is an important example of this because, if Informatic Persons' belief in immediacy is so powerful that they are willing to limit and restrict their knowledge and abilities with technologies, they may be more vulnerable to emerging forms of inequality. As discussed in Chapter Two (in particularly Part Two) and Chapter Three (concerning circulation), so-called third-level divides (Andrejevic, 2014; Graham, 2004) have focused on who has access and skills to use in data circulation and abstraction systems. Given these trends, participants who view learning only in terms of speed are not assured of a skills base that can effectively empower them within the Informatic Context. There is also a potential for exploitation here, as the Celebgate photograph hacking scandal was partly caused by the automatic data recovery system of Apple's iPhone (see Introduction). This is not a hidden feature, but its control does require some awareness on the part of users. The lack of digital skills and awareness around the operation of an interface makes the reprehensible acts of hackers slightly easier. This links discussion on digital skills to ideas of control, with participants' ability to effect control upon the Informatic Context being influenced by their skills level. With control being a

[59] This is not to say that external pressure is not possible around learning behaviours. A service like Google can exert its own subtle influence upon a user via the selective presentation of results, as described by Pariser (2011).

significant theme for Informatic Persons (as will be raised in Chapters Seven through to Nine), the potential for blackboxing approaches to limit control is significant. Also noted in these findings are variations in digital literacy depending on age and gender. Some female participants describe a gendered understanding of technology that may negatively influence their learning, while young people are identified as being more knowledgeable. This suggests that any implications of immediacy and blackboxing may not be evenly spread. Women, for example, may be disproportionately affected by emerging inequality and tensions around technology.

Inequality is not the only potential intersection learning practices have to broader socio-technical assemblage. Issues such as Big Data and surveillance are also influenced by the blackboxing narrative, with limitations in knowledge potentially making Informatic Persons more vulnerable to these trends. Big Data is a specialised field, and immediacy may impede Informatic Persons' ability to understand these situations given the depth of knowledge required to engage with this trend. Surveillance is developed in more detail in the following chapter in relation to risks, with surveillance proving an important part of risk EEAs. While furthering vulnerabilities, immediacy and blackboxing does not suggest any degree of ignorance, apathy or failure on the part of Informatic Persons. It is a reminder that an individual cannot manage or address that of which they are not aware. By voluntarily disengaging, participants may also accept the status quo of these structural trends. Without an awareness of the fact that their actions may contribute to these debates, Informatic Persons silently support a potential inequality that could drastically affect them. This further illustrates the variations in scope a relationship in the Informatic Context can have, with the individual being connected to broader society in unexpected ways.

Informatic Persons are not required to be experts on data or data technologies. It does however mean that as complex technologies become more integrated into everyday life, that awareness and knowledge around these technologies would potentially benefit a user. With the growth of data into everyday life, a minimal level of awareness might be prudent, as it is impossible to control

something that is unknown. The level of awareness, however, must be reconciled with individuals' experiences of learning, which are dictated by immediacy. Informatic Persons and their situated socio-technical context must be considered in detail, as this chapter reveals how the situated experience of immediacy can play an enormous role in structuring an essential part of technology use.

# Chapter 7 — Informatic Risk and Surveillance

## Introduction

Making and maintaining relationships in the Informatic Context is not always seamless, and there is a potential for risk to the Informatic Person through these relationships. While risks are often framed around the broader organisation of society (such as in the obligation participants feel to adopt technology, as detailed in Chapter Five), van Loon (2002: 33) points out that contemporary risks are individualised. Ordinary persons need to develop their own understandings and responses to risk as a consequence of detraditionalisation (Beck, 1992). They create personalised risk-epistemologies (Lupton and Tulloch, 2002: 319). Thus risks need to be considered both as a contextually situated and reflexively negotiated concept, and a macro-social category (Henwood et al., 2008). This chapter develops the risk epistemologies of Informatic Persons. As pointed out in Chapters Five and Six, adoption and learning of the features of the Informatic Context does not guarantee use or success. Safety, certainty and security are also not guaranteed by mediated relationships. In some cases, these relationships may also be a source of risks themselves. Risks in the Informatic Context are defined by ideas of hybridity and control. Risks move across material and immaterial space, and constitute a problem when control of data (such as personal information) is lost. This reflects themes raised in Chapters Five and Six, and what changes in the scale of relationships mean to Informatic Persons. These discussions occupy the first section of the chapter. Following this, an in-depth focus is given to the most common risk participants describe: surveillance. The Informatic Context is revealed to feature many data-capture processes over which participants have little control, constituting a risk. Participants' relationship to risk is not one of ignorance, with no desire for blackboxing or ignorance (see Chapter Six). Instead, participants respond to risk in a variety of situated and nuanced ways. The most common response is to acquiesce to risk, with participants employing situated versions of the Nothing To Fear, Nothing to

Hide argument. These arguments are not indicative of ignorance or apathy, or that participants devalue the importance of control. Instead, they are reflections of the situated nature of risk and value, with participants presenting alternative evaluations of risk in justifying their acquiescence. This challenges assumptions about people under surveillance, and how digital risks are managed in the Informatic Context.

## Risk as Hybridity and Control

Risk in the context of the Informatic Person can be understood as centring around two key qualities: hybridity and control. These ideas develop the risk epistemologies of Informatic Persons, and frame how risks are understood and responded to in everyday life. The linking of hybridity with risk highlights that risks are not easily confined to specific contexts, instances or states of being. This reflects the writing of Deleuze (1992), Latour (1993; 2005) and Haraway (1985) who, in different ways, have emphasised how society is not a pure entity comprised of only one specific element (such as human beings). Instead, reality and social organisation are heterogeneous, impure mixtures of human and non-human elements. Informatic interactions are a good example of this, being both digital and material.

Hybridity is important as participants' experiences of risk are framed around the degree of control they have over human and nonhuman relationships. In the overwhelming majority of cases, risk is understood as the loss of control over aspects of the Informatic Person, most commonly the digital traces and pieces of personal information that are generated through mediated relationships. As Deleuze (1992: 4) has described, control in the (post)modern age takes on a new found importance, becoming fluid and rapidly changing, or what he describes as modulating: "a self-deforming cast that will continuously change from one moment to the other, or like a sieve whose mesh will transmute from point to point" (Deleuze, 1992: 4). This stems in part from the transition from *individuality*, where subjects are defined against a position within a social mass, or what Deleuze's calls societies

of sovereignty, towards *dividuality*, where codes and data define an individual to society. Because of the multivalent nature of data/dividuality, social organisations become predicated towards aforementioned modulations of control, expressing power in a rapidly adaptable manner to fit the many different contexts in which a dividual may be placed. Deleuze (1992) calls this a society of control[60]. The power of data, and the circulation of personal information, necessitates a shift in the way power is expressed, and also the emergence of control as an important aspect of modern social organisation. Similar themes are raised by participants here, with control representing an important part of understanding their ethno-epistemes around identifying and managing informatic risk.

These twin qualities of informatic risk are alluded to in the following statement by Henry:

> I do run a fairly comprehensive application on my [interface] for security purposes. Viruses and phishing and all that sort of stuff. I hope to limit that. I load an application up, it will jump up and this AVG security will jump up and say that this [program] is a piece of crap, or whatever words it uses. Basically this application is trying to read all your stuff. Do you really want it? And you say no and it wipes it. Stuff like that. I've never thought about it before, but reading about it one day and they're saying that people on their phones forget that they are connected to the internet. So I installed a reputable security application, and it's turned out to be pretty worthwhile, probably caught things seven or eight times. And actually caught a virus once too. — **Henry**

Henry's statement identifies hybridity in how risks cannot be confined or isolated, and control through using security software to manage his digital traces. Focusing first on hybridity, the risks that Henry highlights are notable because they can move across a variety of informatic systems that

[60] This is distinctly different from the societies of sovereignty, which express power along Foucauldian lines of disciplinary power (Foucault, 1977 [1991]), where individuals were subjects in specific disciplinary contexts.

impact on his everyday life. He highlights these as "security issues" that come from the use of his device, such as from viruses and phishing. These risks are exclusive to the Informatic Context, and are examples of the dark side of data-abstraction processes. Viruses[61] and phishing come from pieces of code, software programs and algorithms that seek to target a person's digital traces, and are purely abstractive processes. While digitally based, the risks do not remain exclusive to the digital realm. The ultimate consequence of identity theft, for example, is the capture of personal information that can lead to the loss of material resources (like money or property, discussed in more detail below). They are not exclusively material or digital[62]. Instead they are impure risks that transgress the boundaries between material, embodied contexts and ephemeral digital spaces (Latour, 2005; Latour et al., 2012). Security risks may begin in digital spaces, such as in the use of Henry's interface device, but their ultimate impact cannot be contained from other aspects of life. Risks are thus heterogeneous.

The risk epistemology that Henry describes conceptualises risk differently to prominent sociologists such as Beck (1992; 1998; 2009) and Giddens (1990; 1991; 1999b). In describing Beck's approach to risk, Van Loon (2000: 166) states that understanding risk "always implies some form of spatio-temporal delimitation. In order for a probability to be assessed, one needs to specify the parameters of time and space within which the particular risk operates". To understand and manage risk it must be placed in relation to material and physical co-ordinates[63]. It is only recently that Beck has begun to consider how risks may exist beyond the physical, theorising on what he calls "digital freedom

[61] A virus is a malicious code or program that seeks to harm a user in variety of ways (Yar, 2013: 3), including through stealing personal information (Whitson and Haggerty, 2008: 573), while phishing is when a website is impersonated or faked in order to lure a user to submit their personal details to a third party who can then benefit from them (Dhamija et al., 2006).

[62] As Haraway (1985: 150) has argued, "we are all chimeras, theorized and fabricated hybrids of machine and organism", and so too are the risks we face.

[63] This is historically apparent in Beck and Giddens's choice of risk examples, with large-scale disasters such as Chernobyl or Bophal used, and in contemporary examples of terrorism (Beck, 2002; 2003) and global financial collapse (Beck and Grande, 2010).

risk" (Beck, 2013: 1), which relates to the challenges that surveillance technologies pose to the digital society. Beck states these are "unlike the other global risks, [as] the risk we are dealing with does not focus on, result from or repeatedly refer to a catastrophe which [are] physical and real in space and time". They are qualitatively different to the other risks in the global risk society. Henry's perspective on risk is similar to Beck's in that he identifies risks that are not solely material, but immaterial and dispersed through his everyday practice as a consequence of digital systems. Risks are thus decentralised, and not anchored to specific times or places, something that also reflects the increased scale of relationships in the Informatic Context.

Henry's quote also links these hybrid aspects of risk to the importance of control and human agency, particularly in his belief that using digital security tools allows him control over potential risks. As Beck (2002: 40) states, "'Risk' inherently contains the concept of control". Henry's statement illustrates not only the prominence of control in risk discourses, but also examples of conduct that Informatic Persons engage in order to maintain control. The risks he describes in viruses and phishing are a problem because they attempt to access his personal information (his "stuff") without his permission. To counteract this, he runs a security program (AVG) that informs him of when applications and software attempt to access his data and integrate themselves into his device, allowing him to remove them or prevent access if he chooses. AVG enforces his ability to control the informatic traces that are stored on his mobile device, determining who has access to them, and limiting their circulation in networks. Henry believes this is significant, as he notes how many users forget they are connected to the internet, and lack sufficient control of their devices and data. Thus, the use of such security software is understood by Henry as a control mechanism. Henry is unable to directly control the risk he is faced with because, as described above, they are hybrid, existing in a non-material space that comes to transgress the embodied. He has no ability to control or manage code in its raw form, and would be hard pressed to bring order to large digital networks. What he can do, however, is indirectly express control through a piece of security software, modulating

measures of control to fit his context[64]. For Informatic Persons, control is still central to understanding risks but, as Henry's statement suggests, how this is achieved and understood has changed.

These efforts to express control over the hybrid spectre of informatic risk are highlighted in a statement made by Meredith:

> On the other hand I resist relatives who want to do the application where you list what relationship you have with people, and I also don't participate, I don't put my birthday on Facebook and sometimes you know I will [respond to] friends or relatives who will post things on Facebook and I'll actually send them a message saying, like for example my sister-in-law posted a photograph of her son's licence the day he got it saying he was so grown up. I wrote a little thing saying 'identity theft' and she went 'Ohhh of course, delete'. — **Meredith**

In addition to comments made by Mark:

> But, other details, I'd be pretty wary about what I put anywhere. Yeah, oh, just the biographical details that we're [concerned about] — you know, we don't want identity theft, so you just want to be as careful about those as you possibly can, I suppose, to be wary that there are ways of pinching your biographical data, and when people do that that's how they do the identity theft, and then that's, who knows what they're going to do. — **Mark**

[64] Giddens (1999a) describes pre-modern cultures as focusing on external risks: originating beyond and outside of the subject, coming from nature or tradition. They are risks because the subject has little control over them, for example the outbreak of disease or a natural disaster in Ancient Greece. This repeats the argument made by Beck on the previous page. The risks described by Henry are within his comprehension and control. This makes traditional forms of risk management that built upon uncertainty and confusion, such as taboo, irrelevant.

Appropriate conduct in the informatic space is defined by ideas of control, as noted by Meredith and Mark's discussion on identity theft. Identity theft occurs when another person or organisation gathers the personal information of an unsuspecting subject to mimic or impersonate them. A victim loses control over the personal information that defines them in digital networks (Whitson and Haggerty, 2008), with a potential for their personal information to be exploited. Identity theft is an excellent example of the kinds of risk an Informatic Person may face, as its presentation (and associated response) demonstrates the duality of hybridity and risk through crossing seamlessly between digital and embodied contexts. Identity theft is a scaled relationship in that it occurs across material and embodied contexts as well as broader digital networks (particularly social media). This is highlighted in how embodied users such as Meredith's relatives decided to share and digitise personal information, such as a driver's licence number, on social media. Lyon (2001: 16) refers to this information, and other piece of personal data (like that hinted at by Mark in his reference towards "biographical details"), as "tokens of trust". These tokens such as drivers' licences, identity cards and social security numbers are a consequence of hybridity in society more generally. Digital technologies allow more mediated forms of interactivity, which means traditional forms of identification that rely on face-to-face contact are less functional, as relationships become stretched across different contexts (i.e. scalable). Common activities such as banking and shopping now require a means of verifying an individual's authenticity that is not dependent on co-present contact. Passport numbers, car registration numbers and credit card details all provide evidence of an embodied user behind the digital interaction. If this information is lost it could be used to impersonate a user and commit an act of fraud.

Given the significant consequences of losing control over tokens of trust, it is unsurprising to see responses to identity theft emphasise control, with both Mark and Meredith describing a need to control the circulation of data in the Informatic Context. The deep concerns people have around identify theft come from how the crime can undermine the very identity of the Informatic Person. As

Monahan (2009: 158) describes, “Identity theft represents [...] an ongoing shift in the way people and institutions perceive of individual ‘selves’”. As identify theft can be so devastating, Monahan suggests that people are increasingly called upon to enact regimes of self-protection and responsibility, what Whitson and Haggerty (2008: 572) have called a “care of the virtual self”, to guard against identity theft. This resonates with the wariness Mark describes around sharing information, and Meredith’s critical stance to excessive sharing. For instance, Mark describes a wariness about the kinds of biographical details he shares. Thus he manages the possible informatic risk by creating patterns of behaviour that express control and agency over his informatic activities, such as a regime of self-surveillance. Meredith describes a similar program of restricting her conscious disclosures while online, rejecting actions that share personal information. They do not view this as onerous or demanding, and seemingly adhere to this program and encourage others to do so as well in order to manage their risks. Ideas of care and responsibility are closely hinged around control, and around maintaining constant accountability of personal information. For instance, Whitson and Haggerty (2008: 578) note how individuals are encouraged to establish “a programme of accounting for the virtual self which extends to efforts to access and amass diverse elements of a person’s data double” constantly monitoring ones informatic activities, a project which Whitson and Haggerty note is unreasonably demanding on an individual’s time and effort. Despite this, however, both Mark and Meredith describe practices that focus on control in order to combat informatic risks. Mark and Meredith’s statements reflect what Lupton (2006: 19) describes as an expectation and pursuit of control in combating risk, as she states:

> the notion of human agency and responsibility for risk, is accentuated [in understanding contemporary forms of risk]. Rather than being able to see outcomes as a result of fate, as was the case in earlier eras where tradition dictated actions such as marriage and child-bearing, people are now held responsible for

> outcomes in their lives: whether or not, for example, their marriage or career succeeds (Lupton, 2006: 19).

Users are responsible for their informatic conduct and the consequences that come with it, and practices of control become the responsibility of being an informatic person, a necessity that they should judiciously follow, and convey to other users as well. Not everyone adopts control measures with such vigour, with Eliza noting some of the issues that come with both control and hybridity:

> I'm very careful about my birthday now since everyone's been on my case, things like that. In fact that's what I worry about all the time, I mean when you hear about it on the news sometimes you say how stupid could you be? And then you realise, do you have a [document] shredder at home? Yeah, but you know that just screams of paranoia to me. Then I think, no, so you know. Yeah I worry about identity theft. But then I think why would people go after some person in Tasmania, a tiny little town? Maybe they think I'm vulnerable. Maybe. I don't think I am. — **Eliza**

Like Mark and Meredith, Eliza emphasises the importance of maintaining control over her informatic traces, and any information that could identify her. Indeed it is a constant worry, and she views those who fail to achieve control in a negative light. Eliza also establishes limits to her concern, and on how far she is willing to follow the logic of control. Using her existing control practices, and also her rural location as evidence, she states she does not feel at risk and believes herself to be secure. Risks happen elsewhere, away from her context. Yet she also notes that there are other possible avenues that an Informatic Person might need to control for, such as hardcopy documents that might serve to identify her. She also rejects this action, suggesting it to be paranoid. Eliza's statement reflects what Gates (2010: 427) describes as the securitisation of identity. In exploring the financial sector and credit industry, she points to how individuals are expected to take responsibility for their digital conduct in response to risks like identity theft, a near impossible task. As Monahan

(2009) has noted, individuals are increasingly shouldered with the majority of the burden in achieving this seemingly impossible task, and face significant sanction if they fail. Therefore the flipside of controlling for risks in the hybrid and informatic space could be viewed as a near permanent state of worry and concern around these risks, and around individual conduct. Eliza reacts to this by making limits and by seeking justifications and comforts that are predominantly non-informatic, providing a counterpoint against the constant yet uncertain risk of the informatic. Thus there is not a uniform adoption of the logic of control as a response to hybrid /informatic risks. Instead, as Lupton and Tulloch (2002) and Lash (1993) have suggested, orientation towards risks are marked by negotiation and complexity, based on the context and experience of the user in question. Eliza's account still aligns with the established ideas of control and hybridity, but is individually nuanced and shaped. The nuanced nature of risk will be developed in later discussion on surveillance (see page 164).

The hybridity of risk, with threats existing both digitally and physically, means the Informatic Person must face manifold risks. Every possible informatic device, digital service and virtual activity becomes a possible avenue for risk, linking distant worries to one's immediate context. This resonates strongly with what Haggerty and Ericson (2000) describe as the surveillant assemblage, a diverse body of disparate elements united only by a common interest in personal data. This is discussed in greater detail below and, while focused solely on surveillance, the discussion notes how the hybrid nature of socio-technical phenomena like surveillance, which is identified as a risk by the cited participants, means that this threat is quite possibly omnipresent, even if disorganised. In the face of possibly ubiquitous risk, Informatic Persons identify a lack of control as defining risk, and seek to enforce control on their informatic traces. Some embrace this judiciously (Mark and Meredith), while others note the complications and limits of this logic (Eliza). In doing so, risks are viewed as dangerous and negative, with no suggestion that risks and risk taking could be a positive (Lupton and Tulloch, 2002). Additionally, the emphasis on control also means a focus on human agency, and the

capacity of participants to have total dominion over their informatic traces and devices. This is viewed as the solution to informatic risk, but its consistent application is not without problems, and failure to effect control reflects negatively on a person.

So far, informatic risk has been discussed in general terms. For the remainder of this chapter, discussion on informatic risk will focus on surveillance. The key traits of informatic risk (control and hybridity) still remain pertinent and evident here, with discussion on surveillance helping to concretise these qualities in society.

## Informatic Risk as Surveillance

Amongst the risks an Informatic Person might face, none were more prominent than that of surveillance. All participants described surveillance or data-collection practices in their narration of risk. At the time of the interviews the media was saturated with accounts concerning Julian Assange, WikiLeaks and Edward Snowden, and the revelation around the increasing prominence of surveillance regimes in everyday life. Many participants make direct references to this. For example it is raised by Meredith, who noted the importance of former United States Army member and whistleblower, Chelsea Manning (at the time known as Bradley Manning) in addition to Edward Snowden:

> [...] a good example [of my interest in surveillance issues] would be that I signed the petition for [Edward] Snowden and Bradley Manning. You think, well, this is the US Government [that] has utterly declared that they are enemies of the state, so that's an issue that I think about. — **Meredith**

There were also examples of extreme surveillance situations, such as that instituted by the regime of North Korea, as raised by Jack:

> If you lived in North Korea and had one of these [informatic] devices, they can sneak and find out where you are and go and get you. It would be a problem, wouldn't it? If you live in a totalitarian state where they want to stifle all dissent, then yes, there would be some problems [...] — **Jack**

Surveillance is therefore a clear issue raised by participants in understanding the Informatic Context, and their lives as Informatic Persons.

Surveillance is what Lyon (2007a: 14) describes as the focused attention towards the personal information of an individual, with some specific purpose in mind such as management or governance. It concerns the collection and use of the informatic traces and data particulates that the Informatic Person generates and releases as a part of their everyday conduct. As Savage and Burrows (2007) note, part of living in a digital contexts means that numerous forms of "transactional data" are generated, with these data having their own "life", a trajectory of circulation and usage that defines data and their use in some way (Beer and Burrows, 2013). These themes are highly coherent with the abstractive and circulatory pillars of the Informatic Context used in this thesis, and with participants' statements. The surveillant risks that are described by Jack and Meredith also continue to highlight the dual notion of control and hybridity. There are few clear boundaries around surveillance, with surveillance entities able to affect embodied contexts through many everyday relationships. Participants also deploy a nuanced and contextualised sense of control in developing responses they believe appropriate to surveillance risks. This discussion is fully expressed in the final section.

Surveillance and informatic risk can be considered as manifold, with numerous data-collection practices and surveillant entities present in the lives of the Informatic Person. This is indicated by Roger:

> Obviously, I guess I'm somewhat aware of this surveillance, potentials and actualities of these technologies. And I'm aware of it in everyday life I suppose how we constantly [are] giving up to others about ourselves. You know, from your surfing practices on the web, whether it be on your phone or whatever device to loyalty cards in supermarkets to you know, whatever. Like you're always ... You're always giving up data about yourself. And I guess that['s] sold to you as being offering a more specialized consumer service, you know. Like I think about how Amazon or iTunes they make recommendations based on previous purchases.
>
> — **Roger**

The hybrid quality of informatic risk is reflected in how surveillance practices are fluid, and less able to be contained to singular contexts and specific instances. It is a relationship that exists across many different social contexts, but ultimately affects individual practices (reflecting changes of scale in the Informatic Context). Roger's example demonstrates this through how everyday practices such as shopping, consuming media, communicating with other people via technology and using loyalty cards are surveillance practices. This everyday penetration reflects what Haggerty and Ericson (2000) describe as a suveillant assemblage, where surveillance "is multiple, unstable and lacks discernible boundaries or responsible governmental departments" (Haggerty and Ericson, 2000: 619). Haggerty and Ericson's identification of the lack of boundaries for surveillance clearly reflects Roger's view and the hybridity of informatic risk, as both note the multiple possibility of surveillance in the Informatic Context.

For instance, in noting how consumer activities (such as shopping) are avenues for surveillance, Roger refers to the existence of what Gandy Jr (1993) calls the political economy of personal information, where individuals are "panoptically sorted" (Gandy Jr, 1996) based on the worth of their information to companies. Those individuals with personal information deemed of greater worth receive more targeted opportunities and consumption options than those deemed unworthy.

Roger's examples of personalised services and specialised recommendations when shopping are indicators of this. Although popular culture often places surveillance as a tool of state intelligence authorities (discussed further below), recognising the commercial aspects of surveillance reasserts the hybrid quality of surveillance. Surveillance is a relational and hybrid practice that seeks to create digital links to embodied users (Haggerty and Ericson, 2000: 614), with the potential for virtualised digital representations to supersede embodied users. Although the relegation of physical bodies is contentious given the importance of embodied experience (see (Lee, 2015)), the close representation of informatic traces to a person is noted by Roger, as he reflects on how "[the user] constantly [is] giving up to others about ourselves". The very substance of the person is surrendered in these common and routine micro-social interactions with surveillance technology. The commonality of surveillance alluded to in Roger's statement also presents an interesting consequence for the Informatic Person: that there is the potential for *anything and everything* informatic to be a surveillant risk. The hybridity and multivalence of surveillance means any informatic activity (like those Roger describes) could be part of the surveillant assemblage. Several different thinkers have sought to grapple with the possible totality of surveillance, using concepts such as ubiquitous surveillance (Andrejevic, 2012), total surveillance society (Rule, 1974) and ubersurveillance (Michael and Clarke, 2013). According to these ideas surveillance is embedded in informatic networks and services, and conducted as standard in the organisation of the social world.

As noted above, the most commonly referred to instigators and creators of surveillance circuits are state intelligence, security and governance authorities (Dandeker, 1990; Lyon, 1994). This popularity is reflected in both the literature on surveillance and in the cultural representations of surveillance that are expressed by participants. As Kenneth states:

> [Surveillance is] enormous. What do I think about that? In many ways I am truly disgusted by it because it is Big Brother, ain't it? The whole idea of 'Us' and 'Them', the communist state was so terrible because it spied on its people. Guess what?

> Welcome to the current West. We're supposed to be waging a war for these vicarious, these theoretical freedoms and it's bullshit. We've got private enterprises can't wait to sell out to their mates what I searched for last. — **Kenneth**

Kenneth provides a good example of how these representations are considered. He presents both cultural and historical examples of surveillance to construct his view on informatic risks, reflecting on how, during the Cold War, the West's liberal democratic systems were held in contrast to the oppressive Soviet Union, yet now the West has also become a surveillance state. Not only is the state a source of surveillance but, like Roger, Kenneth notes private enterprises are also involved. In noting the shift from surveillance as the domain of a single state to being a part of the current context of the political economy, Kenneth again emphasises the hybridity of surveillance. Furthermore, the description of surveillance Kenneth employs links surveillance to power, specifically the power of the nation state over its people. This is expressed not only in his reference to the Soviet Union but also through his mention of links to Big Brother, the omniscient antagonist of George Orwell's (Orwell, 1949[2009]) novel *1984*[65]. Kenneth posits the existence of a similar regime (potentially the NSA's PRISM program) by describing a Big Brother scenario and then linking this to "the current West". It is understandable that Kenneth evokes the spectre of *1984* in discussing surveillance, as its ability to imagine a future with surveillance is continually referenced and developed in both academic and popular literature (Haggerty and Ericson, 2000; Levin et al., 2002; Lyon, 1994; Monahan, 2011). It also highlights the continued presence of this cultural imagery in how surveillance is understood by participants: as an omnipotent sensory apparatus of the nation state, with enormous top-down power and access into lives of subjects, and the ability to enforce its will on them. This further develops the hybridity of surveillance through indicating the pervasiveness

[65] In *1984*, Big Brother conducts constant mass surveillance on the population, quashing civil and personal liberties, and has become synonymous with oppressive regimes of state-sponsored surveillance in common thought (Koskela, 2002: 12).

of surveillance, and also gives this pervasiveness a quality: negative and authoritarian, particularly in relation to state authorities.

While Kenneth does place the emphasis on surveillance conducted by the nation state, like Roger (see earlier on page 166), Norman notes that surveillance is also conducted by private companies. As Norman states:

> **Norman —** It [surveillance] is a regular thing particularly at the moment. If you look around a couple of recent big leaks that happened to the US and the furore of the way people are talking about how phones are being used with the big monitoring system that the National Security Agency have.
>
> **Interviewer —** PRISM
>
> **Norman —** PRISM, that's [it]. And I remember seeing a TED talk where a German guy spent probably close to a year trying to get access to his actual, the records his phone company kept on his phone and look through the day and when they followed [his] entire journey, to see whether he had called people and when you see that, you can see how much information someone can pull out about your life.

Norman identifies what thinkers such as Monahan (2006) and Bennet et al. (2014) have noted as the increasing collusion between the political economy of information (that is, private surveillance apparatuses) and state organisations. Here the everyday practice of using telecommunications becomes an aspect of the surveillant assemblage and an example of how personal information is collected (and often shared) between private and state organisations, such as the National Security Agency (NSA) and their PRISM program. PRISM, while in service of the United States Government, has been revealed to rely heavily on large informatic companies (like Google) to collect personal information (Greenwald, 2014). The information collected by these private companies circulates

easily, and has become directly linked into state apparatuses (Bowden, 2013). Norman's statement points to this by linking telephone records, created and held by private companies, as being of interest to state surveillance apparatuses such as PRISM. This demonstrates the hybridity and totality of informatic risk, as the possibility of surveillance cannot be isolated to any one practice or organisation. It is instead recognised as highly fluid and scalable, with few boundaries between organisational bodies that spy on individuals, and those that do not. Collaborations between state and private enterprise are especially common for technology companies, who have access to (or the ability to create) large data sets. No entity is more well-endowed with data than the social media platforms such as Facebook, making social media another surveillant risk for users, as Victoria states:

> It's probably in the back of your mind. That you've got Big Brother watching your stuff. But I don't lose sleep over it. I know what information I put up so I only put up what I want people to see and even on my Facebook account if you go in [to] it, it's got no information, [like] your birthday and stuff. I don't put up where I went to school or anything like that. I don't put any information like that up. — **Victoria**

Social media has the capacity to monitor, track, record and use the personal information generated as a part of user interactions on these services (Beer and Burrows, 2007), thus making what is a routine and almost required socio-technical practice (Goggin and Crawford, 2010) a surveillance risk. Social media's potential for surveillance, whether it be the corporate surveillance that Victoria notes, or that conducted by the nation state, has been well documented (Fuchs, 2012b; Trottier, 2012). As noted above, collaborations between states and companies are relatively prominent. Not only do social media platforms collaborate with governments, they also collaborate with other companies, allowing third-party application**s** and services to gain access to the personal information held in these systems (Stutzman et al., 2013: 20). This further increases the hybridity of surveillance, and stretches the relationship across even more distant entities. It is thus understandable why Victoria continues to reference Big Brother, given the almost monolithic presence of surveillance in her life,

and the implied power asymmetry that such an idea suggests. Users of social media have little choice in being subject to surveillance, it comes packaged and standard as a part of use, just as there is no option to refuse state-sanctioned surveillance. They also have little control over their personal information once it is entered into the system. Victoria notes this with a reference to the information she shares on Facebook and, like participants who were quoted earlier (such as Henry), she begins to talk about how she attempts to create control as a user (more details on control strategies are discussed below). However, these negotiations of surveillance are not possible, and users are forced to accept surveillance as a part of their informatic activities, or reject the activity entirely. As Eliza notes:

> My [smartphone] knows where I am going. If I have used the Global Position System (GPS), it must mean to me that even though I think I have turned off the GPS, it's back on again because I've accessed the GPS. And until I was talking to you I didn't even think about it. That's probably why I had so much trouble connecting the first time. [...] I turn off the GPS, I can't access maps. So when I access maps, the first time I did it after I turned off the GPS, it must have turned on the GPS! I hate being that accessible to anybody. To you know Mr Eye in The Sky, to Big Brother.
>
> — **Eliza**

Eliza describes the difficulty of avoiding surveillance in her life, as everyday informatic practices are linked to surveillance systems. Global positioning systems (GPS) allow users to have their precise geo-graphical location pinpointed, a function that numerous social media companies use to provide tailored services and "helpful" user experiences (De Souza e Silva and Frith, 2010). It also effectively tracks a user's movements and preferences across space and time for the service provider (Angwin and Valentino-Devries, 2012). This is beneficial for Eliza (explored in more detail in Chapter Eight), as she lives in a rural area and benefits from mapping applications (raised in Chapter Nine also). With social media interactions increasingly linked to interfaces devices (like smartphones), using such

functions presents an increased risk of personal data being shared. This makes disentangling these services difficult. As Eliza notes, she has switched her GPS on and off depending on her preferences, and noted that access to desirable features (like maps) implies surveillance, a trade-off she hates yet is powerless to change. The reference to Big Brother further suggests the lack of power a user has. While users may lack the power to radically change and remove surveillance, this does not stop them acting against surveillance. Eliza can turn off the GPS in her interface, and Victoria restricts what information she shares on social media, responses that are reminiscent of Mark and Meredith's comments earlier on risk (see page 159). While control begins to reappear in Eliza's EEA, it does not appear as strongly as previous participants, and instead is more relaxed and flexible. For example, Victoria notes she is not overly concerned about the risk, a sentiment echoed by Roger:

> [Surveillance occurring through informatic devices and services] is interesting, I don't have to use [informatic interfaces and services] them but I do sometimes think wow, I might be giving out a little bit about myself. No, but I think I choose to live in a state of being blissfully unaware of [the risks]. — **Roger**

Both Roger and Victoria, educated persons in permanent jobs, note the presence of surveillance in some detail, yet reject any deep personal concern about it. While Roger is entirely unconcerned, Victoria is more worried but, even then, is not obsessive or overly focused on her desire for control (as noted on page 170).

To summarise, the hybridity of risk has been further developed and explored through the lens of surveillance, noting the many opportunities and collaborations of data collection the Informatic Person faces. This discussion has focused on drawing out these patterns of hybridity and fluidity as they relate to surveillance. Surveillance practices and entities are manifold and fluid, with many everyday aspects being the subject of surveillance, a perspective coherent with what Haggerty and Ericson (2000) have described as the surveillant assemblage. State authorities and intelligence

services, private companies and social media platforms are all viewed as sources of risk by participants, with these sources infiltrating routine and mundane informatic activities to collect information. This further builds on issues of scale discussed in previous chapters, with relationships in the Informatic Context occurring across diverse contexts, from the embodied to the distant. Despite the many risks that are identified, no participant withdrew from the Informatic Context in the face of risk, and instead participants continue to conduct their lives through these services and platforms. This cements the centrality of informatic technologies in everyday life as, despite the risks, they hold it is unthinkable that the technologies themselves would be avoided. Such risks are the trade-off that Informatic Persons accept for living and benefiting from a context of data.

## Nothing to Fear, Nothing to Hide — Responding to Informatic Risks

Just as surveillance is a hybrid phenomenon and has a multitude of expressions in everyday life, there are a variety of responses to informatic risk raised by participants. These responses are structured around the common narrative of "Nothing to Fear, Nothing to Hide" (NTFNTH). Nothing to Fear, Nothing to Hide is amongst the most common responses to surveillance, being prevalent in both academic and common thought (Best, 2010; Marx, 2003; Vickery, 2014). It embodies the belief that the sum of a subject's informatics traces and personal information has nothing concerning or worrying that the person wishes to conceal, and therefore they should not be concerned with revealing this information to others. A loss of control over one's informatic traces is acceptable because even though they are lost, no harm will come to the person in question. As there is no expectation of harm, an Informatic Person is also justified in continuing their business unchallenged. Central to this narrative are questions of value, and how much value is placed on one's information, and what value control (or the loss of control) has to an individual.

As discussed above, risk and control are linked concepts for Informatic Persons. This relationship continues here, as participants describe how they negotiate and respond to risks using this narrative.

While control is particularly important to Informatic Persons, there is substantial negotiation around its value. Participants describe competing ideas of values that influence their responses to risk, leaving them more open to acquiescing and adopting NTFNTH thinking. This does not however lessen participants' desire for control, and instead represents how control is practically negotiated and implemented in the Informatic Context. Surveillance is potentially omnipresent, and total control is difficult if not impossible without withdrawing entirely from technology use. Thus while seemingly acquiescing to risks, participants seek to justify and negotiate their continued use in the face of these many risks, while maintaining values important to them, including control. This reveals the NTFNTH discourse to be not an indicator of ignorance of disengagement, but instead a nuanced and contextually situated response to surveillance. Four values are indicated by participants as influential in their negotiation and adoption of NTFNTH thinking: data value, material values, ethical value and personal safety.

**Data Value**

According to Solove (2007), one of the primary rationales of NTFNTH thinking is the devaluation of their data and personal information. Individuals do not often believe their digital traces are revealing or worth investigation, and therefore they need not worry about how their data is circulated or abstracted. Data value, therefore, refers to the judgments made around the worth (or lack thereof) of an Informatic Person's digital traces, and the relationship this has to the desire for control. This assessment of value is a fluid and idiosyncratic assessment participants make on the potential usefulness of their data. Some cases below (in particular that of Gavin and Belinda) use a conception of value that is reminiscent of the economic value of data that Turow and Draper (2012) and Gandy Jr (1993) argue advertisers and corporations can extract. For most participants however, data value is a more general sense of potential utility or productive capacity around one's data to achieve some end, as achieved by non-specific others. This is suggested by Albert:

> I don't think I do anything that interesting. No, I mean, no and I guess that's the other side of it, if you haven't got anything, the argument that people put up all the time is that if you are not doing anything illegal then what's the harm in it, which is a pretty weak argument [to acquiescence to surveillance] in my opinion. But that's the line that will get used a lot. No, it hasn't changed my behaviour. — **Albert**

Although Albert views the NTFNTH narrative as a "weak argument" in general, Albert indicates his practices do reflect NTFNTH approaches. He does not believe his personal information to be interesting enough to be under surveillance, and he has not changed his practices in response to surveillance. Albert therefore suggests his personal information has a low value to a surveilling other, and is happy to acquiesce to NTFNTH thinking. This example illustrates the negotiations present around the value of an Informatic Person's data, as Albert devalues his own data, while indicating that circumstances of criminality or illegality raise the value of digital information. This is in line with Solove (2007), who suggests this approach is a common response to surveillance or data security. Interestingly, such thinking suggests not only that the value given to one's personal information is low, but also that the value of having control over one's personal information is low. A common presentation of NTFNTH arguments is made by proponents of surveillance, arguing that surveillance is there to target and prevent illegal acts, and so long as someone avoids this they have nothing to fear and should not be too concerned about their privacy (Solove, 2011). Control over one's personal information is devalued in these accounts. As Albert suggests, however, there are weaknesses in this argument. It assumes data-collection processes are looking only for specific and valuable pieces of data, such as evidence of illegal activities, suggesting a high degree of specificity around surveillance. Indeed, Lyon (2007a) alludes to this in his widely used definition on surveillance, stating surveillance has a targeted intent and purpose. As Andrejevic (2013) points out, however, surveillance now acts more as a dragnet, leveraging mass data circulation and abstraction

to authorities' advantage, meaning that all data are valuable and potentially usable[66]. Value is therefore a key element in understanding responses to risk in the Informatic Context.

This presents a paradox for Informatic Persons however. If Solove's (2007) analysis of NTFNTH narratives is correct, then control over personal information is devalued through the adoption of NTFNTH approaches, as accepting this logic means accepting reduced privacy (a form of data control). On the other hand, as discussed earlier, control is indicated by Informatic Persons as highly valuable and defining of risks in the Informatic Context. Agreeing to NTFNTH logic therefore conflicts with a core value that Informatic Persons associate with risk, as by ceding to NTFNTH thinking control is deemed less valuable. This paradox is again visible in Julia's statement:

> [I am] Not worried at all [about data collection]. It's not something that enters my mind. People who talk about that and [are] worrying about that, to me I think pfft, what are they on about. I can't see how that would be possibly, if you really think it through I can see where the negatives could be but it's not something that worries me. I don't ever feel like I've got something that I don't want other people to know, or that sort of thing. — **Julia**

On face value, Julia's statement could be viewed as coherent with Solove's (2007) assertion that the low value attributed to control and to personal information supports NTFNTH thinking, conflicting with the importance of control that was developed earlier and creating the paradox. Julia indicates that she adopts NTFNTH thinking because she feels that "I don't ever feel like I've got something that I don't want other people to know". She suggests she is happy to have her personal information visible to others despite having some conception of possible negative outcomes, and that her information is not worth worrying about. While appearing paradoxical, it is important to note that

[66] Advances in abstraction as a part of so-called Big Data surveillance (Andrejevic, 2013; Mayer-Schonberger and Cukier, 2013; van Dijck, 2014).

Julia does not specifically devalue her information or control over it, but instead states that she does not see how it is valuable. This is not the same as suggesting data has no value, or that control is not valuable. Instead, it suggests that other factors maybe influencing how value is determined in relation to NTFNTH thinking. Solove (2007) is right to highlight the importance of determining what is valuable about one's personal information, and its control, as central in this debate. As Bartow (2006: 52) has emphasised however, Solove's position may not have adequately captured what is at stake when individual users conceptualise privacy and notions of control, as she considers Solove to have: "frame[d] privacy harms in dry, analytical terms that fail to sufficiently identify and animate the compelling ways that privacy violations can negatively impact the lives of living, breathing human beings beyond simply provoking feelings of unease". While Bartow seeks to emphasise the "visceral" consequences of privacy violation (something she claims Solove does not adequately use), she also highlights the deeply personal and contextual variables that living human beings have in relation to this topic. Just as violations of privacy and control over personal information can have personal effects and trajectories, so too can the very notions of privacy and control. This is illustrated in Eliza's response:

> **Eliza** — I was playing with a couple of buttons on the phone, and next thing I knew my contacts had gone from my old mobile phone's [SIM] card, to everyone who was in my Hotmail email [...]
> **Interviewer** — So how did this make you feel?
>
> **Eliza** — Violated. I'd rather people don't know. I don't like the fact that everything I do is out there floating around. I'm careful. But I'm not that careful anymore.

Data value and control are personally situated, with contextual variables and circumstances influencing how surveillance risks are negotiated, and what is judged as valuable. When an interface becomes a surveillance risk, such as when her smartphone uploads and shares all her contacts,

Eliza's response is one of personal offence and concern. This feeling does not persist however, as she also notes she is less careful now, indicating nuances and changes in her risk epistemology on surveillance. While Informatic Persons appear to devalue control and the importance of their personal information through acquiescence, what actually occurs are contextual negotiations around the value of their data and control. It is therefore important to analyse risk not just as a global phenomenon, but as contextually and temporally situated[67], a scaled relationship between an individual and larger assemblage. Applying Bartow's (2006) suggestion to the discussion present here means being sensitive to how value is framed by Informatic Persons in acquiescing and adopting NTFNTH logic. Solove (2007) is correct in raising the question of value in understanding NTFNTH, but it is also not necessarily true that his idea of value (relating to control and personal information) is rejected. Value is not rigidly applied, or a zero sum game. There is the possibility of multiple, parallel and possibly competing forms of value in the risk ethno-episteme of Informatic Persons.

Another comment from Eliza illustrates this, as she describes how her personal circumstances influence the value she places on her personal information. As she states:

> Because I consider myself an honest and good person, I'm not particularly worried. [...] You give and take in society. So I care that all my email addresses [are available] to my phone. Yeah because I don't want to talk to most of those people. Do I really care that it is infringing on my privacy? In the real world, no. I think I've protected myself fairly well. Except there are some situations I can't protect myself from because I shop on the net. But you know, I think if you're careful and aware of how much information of yours goes out onto the internet. — **Eliza**

[67] This has also been well established in relation to risk more generally. See Lupton and Tulloch (2002; 2003) and Threadgold and Nilan (2009).

The NTFNTH logic is present through the apparent lack of concern Eliza has for her own actions as she argues she is a good person with nothing to hide. This does not mean, however, that control is not important. Eliza instead suggests that she is already relatively protected, and that she already has control over what personal information is in circulation. The importance of her data, and control over it, is therefore not unimportant, as she takes practical measures towards it. Other contextual beliefs around her data value also influence her decision making however. Eliza's thinking differs from Solove's (2007) in that she tempers her sense of control against the practical potential for achieving control and addressing informatic risks. She acknowledges she cannot have total control over all her informatic activities (like shopping online, and even using her interface device) and, while she does begin to downplay the value of her information, this is an acceptable trade-off. This variation in control also reflects the importance of practices around data in everyday life (such as shopping) and the importance of having access to them and the Informatic Context. As raised in Chapter Five, access is extremely important to Informatic Persons, even if it means negotiating around surveillance risks. As noted by Lee and Cook (2015), the desire for access often trumps surveillance concerns, and is present in other non-affluent groups. Data is not devalued, but interpreted and practically implemented based of Eliza's context.

Part of Eliza's negotiations is that she believes she is already doing a great deal to instil and maintain control. A similar line of reasoning is made by Jack, who uses his absolute faith in his abilities to control his data to justify NTFNTH thinking:

> **Interviewer —** So you're not concerned at all for the devices to track you or [your] use, for example, GPS Locator information?
>
> **Jack —** Well, I know they can do that. If you wanna stop that, just turn them off. Just press the GPS function and turn it off.
>
> **Interviewer —** Fair enough. So you're not at all concerned about the potential for these devices to be more intrusive?

> **Jack —** Well, they're quite intrusive already. But you have the ability [to switch off], it's easy to stop that happening if that's what you want. If you don't want anyone to know where you are, then you can just turn these functions off. You can turn the data off the GPS, then just have it as a phone.

In discussing the availability of his geo-location data via his informatic device, Jack indicates he believes he has absolute control over how his informatic device captures and circulates his digital traces. That is, he can simply prevent intrusions by disabling the offending function "easily". Where Eliza earlier notes limitations on control, Jack emphasises an absolute belief in it. He believes he has the final say in what his device does, and how his information is used, suggesting he has few concerns and is happy to acquiesce. Thus the logic of NTFNTH thinking exists alongside a strong belief and evaluation of control, which demonstrates the differing conceptions of value. While the logic of control continues to be valued by participants, their success in achieving this is unclear. Jack is correct in that he can enable or disable certain functions that circulate his personal information, like the GPS function. In order to address these risks, however, Jack must be aware that the device is collecting his personal information. He does not consider that his agency and capacity for control may have limits[68]. Even with digital functions disabled, considerable amounts of data are collected by the infrastructures that support the Informatic Context (Lyon, 1994). It is unclear whether Jack believes he has control over all of these aspects of informatic circulation, but he is confident in his agency and on the value of control.

Narratives of control are not exclusively focused on a user's agency and individual capacity, but also around the capacity of surveillance and data collection organisations to use individuals' data. Belinda

[68] For example there are roughly 15 sensor functions on any smartphone device, that are actively and passively collecting personal information about the user (Burdon and Andrejevic, 2014), of which many occur without the conscious knowledge of the user as a part of the operating system or informatic platform on which the device runs (Lane et al., 2010). Some devices even collect data while switched off (Sottek, 2013).

and Gavin indicate that their acquiescence to NTFNTH thinking is based on the abstractive capacity of surveillance organisation, and a lack of belief in these abstractions to understand them as Informatic Persons. It is not that Informatic Persons view their personal information as being of no value, but that organisations and surveilling others seem to be unable to achieve anything valuable with this information. To them, this demonstrates a lack of control over data, and legitimates NTFNTH. This is indicated by Gavin:

> I find [data collection and surveillance efforts] amusing [...] I don't find it scary. I know it's done. I think, I almost admire them [surveillance authorities] for their cleverness. [I have not experienced surveillance] so much on my mobile [device], oh I have actually , [there are] the adverts that come up. Some of the applications have adverts on them automatically, that's what you get for [paying] nothing I suppose. But the adverts would be linked to searches I've recently done. If I was looking for a holiday in Norway, [on the] next email at the bottom will be 'Have I got a deal for you in Norway'. Oh I've actually been now, but clever of you to realise I was actually thinking about it. So it doesn't worry me, in a way it is saving me time I suppose because they've got to throw adverts at you, it's how they make their money, you've got to live with that. It's very annoying. But while they're throwing adverts that [advertising think] are useful, I would have rarely bought something from an advert. Because usually they are [wrong]; I'm constantly getting things about solar panels at the moment because a few months ago I was researching solar panels, and I've already bought them, so I don't want to know about them anymore. So I sort of feel like saying I think it's clever you think I'm interested in solar panels, but not anymore. The Big Brother is watching you, do I care? Not really. — **Gavin**

Similar sentiments are expressed by Belinda:

> Yes [data collection and security are a concern]. But I will say I'm not sure how they will use that information. Obviously things like Facebook and Google could be used for various things, moving more into that arena. So I think it's only a matter of time before they master how to use that information, and then I think I'll probably be more concerned, but yeah I guess [I am] being philosophical about it, if companies want to use that information to provide better goods or service, then I guess that's OK. As long as it's not intrusive. And I think that's where I draw the line, for example advertisement keywords, and other things on Facebook streams, and things that use what you're doing on the phone. That's OK. But things sort of directed at you like messages, I'm not really that keen on that sort of stuff. — **Belinda**

Belinda acknowledges a broad paradigm of data collection from the likes of large companies (such as Facebook and Google) but believes that the true impact of this collection is yet to come. Gavin builds upon this, particularly from his experience with Google and online advertising as evidence of this lack of control. The value of personal information for an Informatic Person, and the acquiescence to NTFNTH thinking, is negotiated against the apparent ability of surveilling others. The seeming lack of ability to abstract and circulate their personal information in a meaningful way reduces the need for control, and suggests that organisations do not have any valuable results from their personal information. This is not to say that organisations have no success with personal information. Search engines, for example, often collect and use personal information to target users with specific products (Howe and Nissenbaum, 2009; Zimmer, 2008), indeed it is how Google has become so successful (Andrejevic, 2009), something which Belinda indicates. As Gavin suggests, however, there is an incongruence between his embodied life and what he accomplishes (such as holidaying in Norway and shopping for solar panels) and the products of abstraction and circulation (such as targeted advertising). This suggests to these users that the abstractive processes and techniques in

use lack the ability to be dangerous. Not only is there no danger, but also no utility. As Gavin states, if the algorithms were accurate, then at least they could aid in his searches. Thus Belinda (through discussion on social media) and Gavin (in his experiences with advertisements) are happy to adopt NTFNTH thinking, not because they do not believe it is valuable to control, but because the ability of surveillance organisations appears lacking.

The perceived lack of accuracy of data analysis online is interesting as while participants understand this to indicate a lack of control, many analysts and organisations are pointing to an increased degree of control and ability. Andrejevic (2009: 129 - 31) argues that Google has been very successful in extracting and using personal information from users' email accounts, with Fuchs (2010) noting the significant political and commercial power that Google has collected through its highly developed advertising and user surveillance services. Because of Google's virtual monopoly over online advertising (Fuchs, 2012a), it is also in possession of a very significant data set on individual users' behaviours and practices, which makes it very easy for them to target and even identify users (Andrejevic, 2013). These advances are not necessarily viewed as negative. Belinda suggests non-intrusive advertisements are permissible parts of her use, while Gavin believes that targeted advertisements are a necessary and possibly helpful experience, stating that "they've got to throw adverts at you, it's how they make their money, you've got to live with that". This not a personal risk to Gavin, but rationalised as a part of the political economy of personal information (Gandy Jr, 1993). The value of data is therefore not only negotiated in the eyes of Informatic Persons, but more broadly in society by entities in the Informatic Context. How these entities operate on data can change how Informatic Persons structure their responses to data and surveillance. While abstraction is non-risky when it does not accurately understand their context, Gavin and Belinda do not ignore the potential for data to have value to other organisations. Changes in the visibility of these organisations and their operation may also change how they negotiate data's value, and their surveillance risk.

The responses of Informatic Persons to risk is negotiated around the value of their personal information and digital traces. Informatic Persons use their experiences and situated contexts to determine the value of data, as determined through their various relationships within the Informatic Context. In acquiescing to NTFNTH thinking, they do not devalue the importance of controlling their personal information. Instead they understand data value to be flexible depending on the circumstances and contexts they are in. Control is therefore also contextually applied depending on the needs of users in question. Control is thus not as straightforward as Solove (2007) suggests even though it is still important to Informatic Persons. Factors such as the agency of a user, and the power of other entities in the Informatic Context, shape how control is understood and applied. It is therefore incorrect to consider Informatic Persons as devaluing or ignoring the value of their information, and mindlessly submitting to NTFNTH thinking. Instead, it reveals the variable nature that value has in the hybrid spaces of the Informatic Context.

**Material Value**

Economic, financial and material circumstances are another contextual variable that influences how Informatic Persons respond to risk. Like the discussion on data value, acquiescence in these circumstances is not equal to ignorance or the devaluation of control. Instead it emphasises the competing concerns and alternative values that go into acquiescence and NTFNTH thinking, that can supersede the need for control. This is indicated by Marie:

> I'm not obsessed with my privacy, I don't have anything to hide. If someone wants to really know where I am? Do I really care? No. It doesn't faze me. And as I said, there is nothing that I do with my phone that would, that is attached to my finance. It's all just social stuff really. — **Marie**

This is further developed by Mandy:

> It might concern you but I'm not going to lock myself away from it either just because I'm being paranoid about something like that. I'm not particularly wealthy, I don't have much to lose. I don't have credit cards with high limits so no one is going to be able to take a whole lot of money from me. I don't think it's a particular issue for me, to be honest. I am a little bit careful about using credit cards online and those sorts of things. But, yeah, it doesn't worry me that much. — **Mandy**

Examples of risks and risk management in the Informatic Context are determined through the relationship that personal information has to economic and material circumstances, such as access to bank accounts or credit cards. Despite informatic risk being defined as hybrid, Mandy and Marie, in responding to this risk, indicate that only the material and embodied consequences (such as financial attainment) are viewed as valuable and important. Mandy and Marie both reject concerted and focused efforts to maintain control over their personal information, such as those mentioned by Mark and Meredith earlier on page 159, and are relatively happy to acquiesce. They view the regimes of self-surveillance and digital care (discussed earlier on pages 159 and 160) as indicative of paranoia and obsession, and largely unnecessary. Marie indicates how this belief is based around certain kinds of information only, such as "social" information, or her geo-location data. Risks, and the need to control personal information, are limited because they do not have obvious material consequences. Both Mandy and Marie add a significant caveat however, and note that should the relationship to their material value change then significant attention or concern would be paid to those data. This sentiment is reflected in Lee and Cook's (2014) work on members of Generation Y, who express similar beliefs in justifying their exposure to surveillance practices. Just like Mandy and Marie, Lee and Cook's (2014) participants indicate a threat to their material circumstances would prompt them to change their relationship to surveillance. Without this kind of push, they were unlikely to change, and happy to accept the benefits of informatic access (particularly rapid data access). Control is not unimportant, but contingent upon material values.

Linking material and financial values to control and risk is interesting given the socio-economic position of the Informatic Persons here. Mandy and Marie are part of the affluent section of the population sampled in this study, and have significant household incomes in excess of $100 000 AUD. Their relative socio-economic privilege is downplayed here, as Mandy makes specific statements to counteract this sentiment, believing that she is not "particularly wealthy". As a consequences her position in the Informatic Context is reframed as less risky, and not worthy of control, despite her background. Further to this, they also do not recognise how their data might hold economic value itself. Numerous thinkers have highlighted that personal information has economic and monetary value in the Informatic Context (Andrejevic, 2013; Elmer, 2003; Gandy, 2012; Turow and Draper, 2012). As mentioned above in relation to Gavin and Belinda (see pages 181 and 182), data-abstraction practices are capable of extracting significant value from personal information. While Marie does not believe the "social stuff" and social data that her interface holds is relevant, with the right abstraction any kind of social data has value in contemporary information economies. This has been the case for some time, as Gandy's earlier work points out, with social data collected from pre-digital sources (such as one's location and general demographic data) being able to identify individuals and groups (Gandy Jr, 1993). This information allowed certain populations to be differentially treated and profiled, with those deemed desirable receiving greater access to economic advantages. Digital data and transactional data of the kind that Marie has on her phone, are more detailed than pre-digital information, and more rigorous analytics and abstractions are possible (Andrejevic, 2014) with more potential impacts. The role of economic and material value in the Informatic Context is therefore something that features at both the individual and societal level, and can play a role in mediating Informatic Persons' responses to risk as well as their acquiescence to NTFNTH thinking.

**Ethical Value**

Further contributing to the differing accounts of value that Informatic Persons describe in relation to NTFNTH thinking, Kenneth and John describe how different ethical[69] perspectives influence how they evaluate their data, and their control over it. Instead of focusing on how personal information has some kind of instrumental capacity (like economic attainment), Kenneth and John focus on how their data represents their ethical conduct. How these representations align to their own ethical standards determines how valuable their information is and whether it should be guarded, or if accepting NTFNTH logic is acceptable. As Kenneth states:

> [...] it comes down to this really, it's a cost benefit analysis. Yeah, I am pissed off about all this [surveillance ] stuff. I think for a lot of people doing something as harmless as having an affair on their wife it sucks. It actually stinks. [Ordinary people] should have the right to run that device without these worries but they simply don't. In my case, I don't care. As I said, I'm not doing anything criminal. I don't bloody care. I have no personal reason to be concerned. — **Kenneth**

John also raises similar points:

> The simple answer is, if you always tell the truth you don't have to have a good memory. But if you are into lying and subversion, then you're probably at risk with these types of devices because the data is available to others. So I suppose the news might be sort your ethics very early on with your life. — **John**

Kenneth and John both describe different ethical situations in evaluating personal data. Kenneth describes how he considers informatic risks like surveillance as a "cost benefit analysis" between possible gains and consequences that might come from his personal conduct. He describes how non-criminal acts are "harmless", but those that are ethically dubious, such as having an affair, now

[69] Ethical value refers to the personal judgments participants have around right, wrong and the appropriateness of conduct towards others.

become problematic as informatic technologies can reveal this to other sources. In using this example Kenneth adopts what Nissenbaum (2004) identifies as a traditional definition of privacy, where social life is divided into public spaces where all is observable and open to question, and private spaces (such as the home) are invisible to scrutiny and tightly controlled by those within the space. Kenneth suggests that such private acts of conduct, while possibly dubious, are not criminal and thus he has "no personal reason to be concerned", because he is not engaging with these. The transactional forms of data that might indicate he is having an affair, or committing a non-criminal act, are not deemed as valuable or important for him to control. He does indicate, however, that this private information can be collected and has possible uses. Trottier (2011) also notes this, pointing to examples of how innocuous private or personal information that appears on social media (such as photographs of a party) can be used by private organisations (like universities) to monitor and discipline employees (or students). By focusing on his personal conduct and how his digital traces reflect this, Kenneth's decision to acquiesce is mediated by his moral compass, and an understanding of ethical value in relation to surveillance.

John also highlights notions of ethics and morality in determining the value of his personal information and how it should be controlled. In contrast to Kenneth, John argues that these private ethical choices are very important. He suggests that immoral acts like "lying and subversion" place an individual at risk, and that one's personal ethical compass should be set as soon as possible to avoid this. John's position reflects the "just world hypothesis" (Rubin and Peplau, 1975), an assumption directly linking moral outcomes to personal actions. In short, good things happen to good people, and bad things happen to bad people. One need only be good in order to avoid bad consequences in life. For John, this position appears to grant him the comfort and support necessary to dismiss informatic risks and adopt NTFNTH thinking, to the degree that "if you always tell the truth you don't have to have a good memory" because a positive action will be rewarded with good action. John's statement returns the discussion to Solove's (2007) exploration of value as John's

thinking, while pointing out the importance of personal morality in mediating action, also resonates with previous discussion on NTFNTH thinking and the different kinds of value used to mediate acquiescence. The idea that if a person has not done anything wrong then one is at no risk of negative consequences of surveillance is one of the primary defences of NTFNTH thinking. It is often deployed by proponents of surveillance (Sewell and Barker, 2001; Simone, 2009) and is popular amongst technology users like John (for example see Pavone and Esposti, 2012). In this case, however, it is heavily mediated by discussion on the ethics of use, as well as the value of control.

**Personal Safety as Value**

Another distinctive argument that is presented in justifying NTFNTH thinking is what might be referred to personal safety. Several male participants (four out of 12 males) describe how they understand their acquiescence, and their adoption of NTFNTH logic, by evaluating their personal information in regards to personal safety. They describe scenarios of extraordinary and unusual levels of risk, and make a distinction between these and what they view as their own relatively mundane context. By comparing their ordinary life trajectories to examples understood as radically different, they set up a situational dichotomy, between extraordinary circumstances where risks must be focused and managed with intent, and mundane contexts that are distant from significant risk. Thus the value of their personal information, and also the value of control, becomes linked to their context, and the degree of safety therein. Given that the threshold of concern they set is quite high, they feel justified in not worrying about their personal information or its control. For example:

> **Interviewer** — So you're not at all concerned of the potential for mobile technologies to record and monitor everyday life for you?
>
> **Rich** — I've got nothing to hide.
>
> **Interviewer —** So do you think that's just the matter of fact of it?

> **Rich** — I think that's the generally matter of fact of it, I mean potentially if I was in a slightly different situation, maybe I would be a little bit more concerned. In the sense that maybe I had a serial killer after me who wanted to know my whereabouts and what I was doing I may be concerned.

Rich's statement highlights the logic of personal safety, and how responses to risks may change based on the translation of the digital sphere in the embodied, physical world. He compares his context, that of a personal trainer and business owner in his mid-20s, to a hypothetical scenario where he is a target for a violent offender. Although young Australian males are identified as a group that is more likely to suffer acts of violence as a part of their everyday life[70] (Hemphill et al., 2009; Indermaur, 2001), the chances that Rich will be the target of a specific violent attack from a serial offender are unlikely (Mouzos and West, 2007). Rich accepts NTFNTH thinking as he has not reached a threshold of personal insecurity which would justify changing his approach to data. Interestingly, while male participants make these claims, female participants do not link physical safety to digital relationships, despite often being the victim of hybrid risks such as online stalking (Pittaro, 2007; Snell and Englander, 2010). Andrew also describes a similar scenario to Rich, although he is more vague:

> [...the] wrong person might find out where you are. I mean that's unlikely but that could happen. — **Andrew**

Andrew's statement conveys a similar point to Rich. Acquiescing to NTFNTH thinking is acceptable because the likelihood of any threat to his physical, embodied safety is small, and thus the need to control his data is small. Of note here also is how both Rich and Andrew continue to describe informatic risk as hybrid, linking how digital and mobile data traces can be translated into embodied

[70] Alcohol plays an important part in this (Herrenkohl et al., 2012; Livingston, 2011; Scholes-Balog et al., 2015).

actions and risks, and therefore how their mundane life could be at risk. By focusing on the physical safety of users, however, the catalysts for actually making meaningful change are emphasised as non-digital and embodied. This resonates with Marie and Mandy's comments earlier on how something is only truly risky when it comes to affecting lives outside of the digital sphere (see page 185). Acts of risk might be linked to the Informatic Context (and thus be hybrid in nature), but material or embodied circumstances are the trigger for more stringent risk management.

Several other male participants also adopt this dichotomy between the mundane and the everyday informatic lives they lead and unusual, and therefore risky, scenarios. Mark, for example, raises the issue of North Korea:

> The way to control societies in the past, and even now if you're in North Korea, is to limit access to information. I mean, that's what the power brokers always used to do, that's how they had power, because it was power over information. But, I don't think you can do that anymore, I think it's much more difficult. And so, people are much more equal, because, in a sense, we have equal access to information, now. — **Mark**

Jack also uses North Korea as an example:

> Well, in Australia, no. If you live in North Korea and have one of these devices, they can sneak and find out where you are and go and get you. It would be a problem, wouldn't it? If you live in a totalitarian state where they want to stifle all dissent, yes, there would be potential problems. In a place like that, you have to be very careful with what you do with your phone. Probably better off getting a dumbphone where they can't find you. — **Jack**

Mark and Jack both refer to North Korea as an exemplar of a situation that would be exceedingly risky. This indicates that the threats to their personal safety would need to be enormously widespread (that is, society level) and potentially fatal for them to be concerned about their personal information. At the time of the interviews there was some discussion in the media surrounding human rights violations in North Korea. The comments made about limitations to accessing information (Mark), and totalitarianism and the crushing of dissent (Jack), refer to some of the harrowing accounts that the media was circulating at this time (see Harlan, 2012; Park, 2012). By drawing on previously developed incidents, participants are able to further justify their personal positions, continuing to draw a mutually exclusive dichotomy between their contexts, and ones of high risk. The level of risk is also so extreme in nature. This further cements their decision to acquiesce, as it is unlikely that anything could make their personal lives as risky as in North Korea. It is interesting however, that while Mark and Jack use North Korea as an example of a worst-case scenario of risk where surveillance is pervasive and the consequences great, they do not make any association between the growing surveillance regimes employed by the developed West (such as PRISM) and their capacity to capture their data.

By allowing ideas of personal safety to modulate how the value of control and of one's personal information is decided, these users are able to create a great deal of distance between themselves and any risks. Their lives are entirely disconnected from these scenarios, which are so different to what they might experience as a part of their normal informatic conduct, that risk seems like a distant afterthought. With risk so distant, little value is given, or concern paid, to risk and how this relates to their Informatic Context, and experience as Informatic Persons.

## Conclusion

Responses and understandings of risk, particularly those around surveillance, are nuanced and situated within the Informatic Context. Informatic Persons are aware of risks, as defined by control

and hybridity. There are also numerous responses to risk, as revealed in the discussion on surveillance. This discussion is particularly important, as it challenges a fundamental misconception about individuals within surveillance-intensive contexts, such as the Informatic Context. As noted elsewhere by Ball (2009), Lyon (2001) and Smith (2015), it is often the case that individuals in a context of surveillance are framed as disengaged, apathetic or ignorant. This is despite the implausibility that every individual, in every context, will keep and hold this disengagement. The NTFNTH logic discussed here is often used as an excuse or justification for disengagement. As developed here however, this can no longer be assumed. Even when individuals use logic that appears to suggest apathy, contextual negotiation is present. Participants reconceptualise and reflect on what is of value, and what is not, in understanding contexts of informatic risk. While they do ultimately acquiesce to these risks, they do so as the product of negotiating the various values present in this context. Control and oversight over one's data is an important value for Informatic Persons, contradicting typical perspectives on NTFNTH logic, which assume ignorance and a dismissal of the value of personal information. This is not the case. It is not that controlling one's personal information is not valuable to Informatic Persons, but that control is negotiated with competing and situated ideas of value. This highlights the importance of studying the context of risk and surveillance, and individual perspectives on it.

Another critical aspect of this discussion is the further development of the variable scale of relationship in the Informatic Context. Surveillance risks reflect the potential scale of relationship in the Informatic Context. Such risks are a connection between the individual Informatic Person (and their situated responses and judgments), and a much broader assemblage of socio-technical systems that are distant, yet powerful and ever-present. As developed in Chapters Five and Six, these connections are not tangential, but can directly influence behaviours such as adoption and learning. The connections here, especially around surveillance, are bilateral as participants respond to risks as they flow down to them. They are not ignorant about surveillance risks despite their distance, and

they do not allow this to continue unchallenged. As noted below however, while bilateral, this relationship is not necessarily equal, as participants' responses to risk reflect the limits of their context and ability (a theme revisited in Chapter Ten), such as through negotiating a personal view on value, and acquiescing.

The decision to acquiesce is not unproblematic, however, and raises issues similar to those discussed in the previous chapter around learning and digital divides. By coming to the conclusion that acquiescence is acceptable, Informatic Persons continue to support the status quo of surveillance patterns within the Informatic Context. While they are willing to make some changes, and are clear about the circumstances of these, Informatic Persons are largely content to accept the current hegemony of surveillance. In doing so, they again lend silent support and tacit authorisation to surveillance-conducting entities, and perpetuate the current balance of power between surveillance subjects and surveillance organisers. This is to a certain extent understandable. Even though potentially surveilled, Informatic Contexts have numerous benefits (which will be further developed in Chapter Eight). Ignorance is not a factor here, and relatively few people in society have the ability (or power) to individually challenge the surveillance might of the status quo. The recognition of surveillance subjects as engaged, and in possession of specific EEAs around surveillance, is a positive direction in addressing surveillance and could be used to develop new approaches that target these factors in developing awareness and responses to problematic kinds of surveillance. For Informatic Persons, surveillance and informatic risks are cemented as a central part of their relationships in the Informatic Context, and a potential site of more conflict.

# Chapter 8 — Everyday Sociality within the Informatic Context — Networks, Control and the Advantage of Informatic Technology

## Introduction

With informatic technologies so central to everyday relationships, it is unsurprising to find that the way Informatic Persons conduct mundane and daily activities has changed. This chapter explores these changes, and the EEAs participants develop for their everyday lives in the Informatic Context. These EEAs are significant as they provide the basis for contemporary forms of self and identity with technology. As stated in Chapter Three, Informatic Personhood is not a theory of personhood, ontology or identity per se, it is a reference to persons who live within a context of data and technology. It is unreasonable, however, to totally ignore the potential impacts that the Informatic Context has on identity and selfhood, as these technologies contribute a great deal to social relationships. As will be discussed in more detail, recent research from Rainie and Wellman (2012), boyd (2010; 2014) and others (Clarke, 1994; Papacharissi, 2010; Zhao, 2005) has indicated that with the rise of digital and network technologies, different approaches to sociality and relationships have appeared. There is a "new social operating system" (Rainie and Wellman, 2012) in effect which leverages the affordances of the Informatic Context to offer a new socio-technical approach to sociality. However, as with all socio-technical situations, it is not deterministic and can be resisted, controlled, appropriated, re-imagined or contested depending on the individual person. It is these dynamics, and the enactment of a sociality that is infused with informatic technologies, that is the focus of this chapter.

The primary findings of this chapter are that informatic technologies and services make a positive contribution to everyday socialities, and that they provide a socio-technical advantage[71] to participants' lives. As will be advanced below, participants detail several positive changes to their everyday lives that come from informatic technologies. Specifically, informatic technologies allow participants to have a greater degree of control over their social realities. Through digitally mediated interactivities, the Informatic Person is able to effect greater control over the self, and the circumstances of their social reality. Informatic Persons use technology to manage relationships and social situations in a way that advantages them and their interest. This does not necessarily have to include interactions with humans, and the management of time is also noted as a positive advantage of technology. The pillars of the Informatic Context allow a person to have greater control over themselves and their social reality, that is the primary advantage. This control and the positive advantage that informatic technologies bring is built upon an overall reconfiguration of social relationships, and the primacy of networked social morphologies in everyday life. This networked orientation also reflects the changing scope of relationships in the Informatic Context, as raised in Chapters Five, Six and Seven, with the entwinement of individual practices and broader socio-technical circumstances occurring regularly. As will be explored first, participants detail how their social contexts are increasingly networked, conforming to an organisation that is non-hierarchal and fluid, achieved through ranges of informatic and digital interactivities. This chapter concludes with some discussion of the value of control and the potential paradox it poses for Informatic Persons.

## Informatic Persons, Everyday Life and Network Morphology

Living as an Informatic Person means being a part of a social and technical context that is increasingly organised and characterised under the logic of networks. This means that the organisation and operation of a person's social relationships (or social morphology) comes to reflect the structure and characteristic of a network, as a opposed to a hierarchy or other organisation. As

[71] Advantage refers to any means that allows a participant to further their personal interests or desires.

boyd (2010) points out, the orientation towards networks is formed with informatic technologies but is not determined by them. A network morphology emerges from the confluence of technology, people and social practices that emerge from this new arrangement, what she describes as a "networked public" (boyd, 2007; 2014). Participants' descriptions of their everyday life begins to illustrate this network morphology, as their lives no longer solely concern immediate, physical and co-present activities, but feature networks of informatically mediated interactions that are vital to successful living. These networks encompass immediate social contexts, but also have connections to broader socio-technical assemblages, reflecting changes in scale. For example, Mark describes an ordinary working day with his informatic devices in the following way:

> I'll check my email [during the day], but that's only if I'm not back at my desk, and I think something might be going on. And then, because it makes a noise when I get an email I know that I've got to do that. So, that does that too, obviously, because it's got the calendar, [...] but that's just a handy extra as opposed to something I really want to. So the office can call me anytime they like. [...] Well, obviously [my interface device is] for communication, but I'm not a real great phone call talker person, but I do if I want, I've got that, and that's really handy. My daughter, well, my daughter because she's younger, text is her main communications, so if she wants to send us a message, and I can use it to check my email, and use my Facebook account, which I don't really use that much but, you know, you can check it, but, yeah, that's probably about it. And then you do all the other things, internet banking. I hardly use my computer for that [...] I just use my phone for that.
>
> — **Mark**

Mark's statement provides several indicators as to how living as an Informatic Person closely aligns with network perspectives on society, resonating with insights provided by Castells (1996; Castells et al., 2007) and Wellman (2002a; Wellman et al., 2003b). For example, the social interactions Mark

describes as a part of an ordinary personal and professional day do not occur as purely face-to-face interactions, or in co-present human environments. Everyday social interactions like receiving an email or completing personal banking occur across physical and temporal contexts (such as when a work email is received outside of the office), and implicate entities outside a user's situated context (social media networks, banking and commerce systems) in the performance of everyday life. Informatic communications such as email and social media (examples of circulation and abstraction), and also telecommunication measures like text messages, are asynchronous forms of communication (Schroeder, 2010), allowing social interactions to be made at a physical and temporal difference, a phenomenon described by Giddens (1984) as time-space distanciation. The recipient of a message does not need to be available in time or space to receive and reply to the message. Mark's daughter can return his message later, when and if she becomes available. Other users will respond to his social media use when they become aware of it, and not instantly when Mark shares it. This change reflects what Castells (2000a) describes as the shift from the space of place[72], to the space of flows, that occurs within the context of a Network Society. With the transition to network forms of organisation, such as that provided by informatic technologies and digital networks, a space of flows is created. Here, social organisation and interaction are not fixed (spatially or temporally), but are instead defined by constant flows and connections that occur across time and space. These flows are described by Castell as "purposeful, repetitive, programmable sequences of exchange and interaction between physically disjointed positions held by social actors" (Castells, 1996: 412). Translated into the present example, flows represent all the social, yet informatically mediated, interactions that Mark describes, such as his social media contact and messages to his daughter (as flows of information across time and space) to his internet banking activity (information and capital moving at a distance). They are the informatic traces, digital threads and electronic fingerprints of the social life of the Informatic Person.

[72] According to Castells (1996), the spaces of place are those places where social interactions and organisations are mainly physically co-present, and neither geographically or temporally dispersed.

These informatically mediated social threads are further described by Roger, who reflects with some amazement at their place in his life:

> Yeah, I really think it helps with work and that's the main drawcard but I guess what amazes me about these technologies is their multifaceted nature, like all the different things that it enables you to do [...] So one moment you're organising your work life, the next minute you're doing something regarding your personal life, whether it's a Facebook update [...] or sending a text message, or you know, taking video, taking photos. So it's like this, I guess the word that you use is that sort of convergence of all these different aspects of your life into this one technology and it sort of, it just kind of baffles me to the extent which you can do stuff so I guess I'm kind of like, I have sort of stars in my eyes a little bit with some of these technologies. — **Roger**

Roger's statement reflects the presentation and quality of these flows as they apply to the socially and digitally networked life of the Informatic Person. His epigraph first emphasises multimodality, and that the flows of everyday social practice can occur across a variety of abstractive and circulatory channels of varying scope, from social networking (Facebook and its related assemblages) to audiovisual means (photos and video in his immediate context). This multimodality is emphasised more broadly in concepts such as polymedia (Madianou and Miller, 2013; Madianou, 2014) and spreadable media (Jenkins et al., 2013) to indicate the flexible and polycentric affordances of media and technology and their role in facilitating social action. As Madinou (2014: 667) suggests, while material affordances are important, they are only meaningful in the context of relationships and social and environmental contexts, with how these multimodalities are used to maintain and achieve these relationships being of the greatest importance. In Roger's case, these multimodal flows occur in the context of mediated relationships, allowing him to interact with different spheres of his life (personal and professional life) with greater ease, and in a variety of different ways (through digital

media or audiovisual means, in addition to in person). This further reflects how informatically mediated interactions are increasingly "spreadable", with information and media being easily circulated across platforms near and far (Jenkins et al., 2013). Roger's statement reflects this in his comment about how easily the variety of informatic flows he produces are circulated, and how this represents a positive experience. Together with Mark's comments, the integration of flows into mundane relationships and operations is revealed.

The importance of flows to the functioning of the Informatic Person is further elaborated on by Kenneth, who notes both the importance of the informatic in his everyday life, and what can happen when the informatic flows are disturbed:

> [...] until now, I've had one email address for 26 years and hundreds of people know it. Imagine. And I get an awful lot of traffic. That account disappeared the minute I [retired and] walked out the door which was pretty harsh I thought. It really becomes an issue for any retiree, could their previous boss at least run it for a month so that you can contact people? Because a lot of things now, I've got accounts on, say, Ebay, what do you pay that with? PayPal? So PayPal's going to confirm all sorts of shit to my old email address and it's gone now. So I have to find a way to contact PayPal and say, I no longer have that address and that's going to be, you can see the complications unravelling there. So I probably wind up wanting to get a whole new bunch of accounts to use on the new email address. Having this phone in my pocket means that I can do that in a lifetime. I can do that at a shot if it becomes essential. I can do it on the net. And I do get my email now directed to my phone [...] It's really useful. — **Kenneth**

Kenneth is responding to a question about how he uses informatic technologies in his everyday life, and indicates how the Informatic Person's lived context is networked, and as a consequence his

actions can be limited, shut down or curtailed through the actions of networks' entities. Like Mark above, and in coherence with Castells's (1996; 2000c) ideas, Kenneth's interactions may be conceptualised in terms of flows. His daily life is the source of several different flows, flows that are individualised and personally centred, as he sends email from his phone, surfs the internet and shops using Ebay. This act of shopping facilitates a further example of the Network Society that Castells (1996) describes, but also it represents the changing scale of relationships in the Informatic Context as it indicates how a retiree in Tasmania can enable a flow of money and goods from a distant location to his immediate context within a short timeframe. This relationship is largely positive, as Kenneth highlights the usefulness of his device and associated relationships in keeping in contact with people and shopping. What is also highlighted is how the success or failure of Kenneth's daily activities can be contingent upon the informatic aspects of the network. For example, the deactivation of his primary email account disrupts the data flows Kenneth uses in everyday life, making it difficult to conduct online shopping, as this is mediated via abstractive services such as Paypal[73]. These services are connected to his old email account and cannot be operated without a current email address, proving an annoyance to him. This highlights how central informatic identifiers, like an email address, are so important to both the Informatic Person and their social network. While facilitating a more dispersed and scaled network, social relationships can become contingent on circulatory systems that are built on the presumption that flows cannot be disturbed. Flows are not invulnerable however, and their disruption (such as a loss of email access) represents a failure to advantage the Informatic Person, as without these the flows a network cannot reach the individual in question, or verify their physical existence (Lyon, 1994). This indicates the integration and contingency that network social morphologies have for the Informatic Person, and how networks can be dis/en-abled by the numerous other socio-technical entities present in an assemblage.

[73] Paypal is a third-party payment vendor used in digital transaction. It acts as a mediator between a consumer, the online marketplace, and a bank, so that a user's bank details are never revealed to a seller. The user's details are protected behind a layer of digital encryptions and data manipulations, making it an example of abstraction.

Roger and Mark's statements reveal how the Informatic Context has allowed social relationships to become configured around networks (and therefore circulation). As boyd (2007) describes, the information technologies that enable a space of flows also reorganise the flows and interactions of the social space in question. The affordances of technology create a social architecture that is predicated on the properties of flows and the technologies that enable them, as the importance of Kenneth's email in everyday life demonstrates. This allows networks to become the dominant social morphology for people living within a context of data. Further evidence of this is provided in the following statements from Naomi, who describes everyday social interactions that are dominated by flows and structured around their affordances. Firstly, she refers to her use of Twitter in public circumstance:

> Yes, I have got a Twitter account, I follow a couple of people but again I find it isn't that useful. So there is a younger academic I used to work with who does stuff I am quite interested in so I follow him on Twitter [...], I like contributing to things like Trip Advisor and things because I use them when I travel and I use my Twitter account which is pretty anonymous I figure, but from the point of view of say my Twitter name is and I hope it doesn't say anything about me, but I will use that if I want to comment on Urban Spoon or Trip Advisor or something. Both apps I have on there. — **Naomi**

This is followed by an account of how she communicates with her family:

> I would text my kids or sometimes [would] ring them up, I talk to them face to face too but I do text them. Got my mother using emails sometimes which is really [good...] I have mentioned Facebook photos, and my niece who is at uni[versity] in the [United] States, she uses What's Up so I have got What's Up on there and my sister who lives overseas, she uses Viber so I've got both of those. — **Naomi**

Naomi also makes reference to her supervisory work as an academic:

> So a lot of my PhD students are also elsewhere in the state [of Tasmania] or elsewhere in the country. I have Skype meetings with them and if I am not in the office, I can have it on the mobile device. So that has probably changed the way I communicate. — **Naomi**

The structure of Naomi's everyday social interactions are highly networked, conforming with a pattern described by Wellman et al. (2003b) (and later Rainie and Wellman 2012), in their work on Networked Individualism. This refers to a mode of social operation that is based on individually developed and used networks, instead of traditional or pre-existing social hierarchies or common geographical locations. Individuals build a non-hierarchal network of their choosing as a part of everyday life. Naomi's statements reflect key aspects of networked approaches to sociality. For instance they emphasise a diverse range of relationships that are mediated by external circulatory and abstractive platforms (Skype, Viber and Facebook for example). Her situation matches what Mok et al. (2010) note as the glocalisation of social relationships, meaning that social interactions are simultaneously local (physically co-present, no mediation necessary for contact) and global (physically dispersed, requiring mediation for interaction). This captures that changing scale of relationships in the Informatic Context, with connections between entities near and far implicated in ordinary social life. This is also present in Meredith's experience:

> For example I'm on a bus with my Samsung [interface device] and I've got nothing much to do so I might try and read a blog [maintained by friends I went to university with...] it actually enables communication that would not have happened otherwise, an interactive communication. [...] So it just improves the quality of the depth and richness of knowledge that you can have about people you don't see. You can see a photo of them really happy, with their family. And you can have this

> vicarious enjoyment for them [for example] here they are at their child's wedding.
>
> — **Meredith**

The shift towards a network form of social organisation is described by Meredith as improving her capacity to communicate with those important to her, in a way that would not be possible without mediation by network entities. Meredith's experiences reflects this, as she connects with distant friends using a blog, enabling her to see how their lives are progressing (such as through photos of their family posted online). These examples evidence how advantage is leveraged off the affordances of circulatory and abstractive assemblages like social media, with boyd (2010) describing digital spaces as affording greater persistent (digital content stored longer), replicability (easily copied), scalability (digital contents' visibility may vary greatly) and searchability (can be searched). Naomi and Meredith utilise different aspects of these services to their advantage. For instance, Naomi creates and uses a range of social relationships of different qualities to improve her everyday operations, from anonymously contributing to reviews on reputation applications like UrbanSpoon or TripAdvisor, to Skyping her PhD students, and finally using social media and communication apps with her family. Naomi creates a set of connections and flows that occur across different spatial, temporal and digital contexts in order to enact her situated context. The qualities of these interactions differ, however, creating "weak" and "strong" social ties. Her use of abstractive platforms like reputation apps[74] and Twitter represents weak associations with large groups of people, who while distant can be a source of information and support depending on how Naomi has built her network (see Gruzd et al. (2011) for an example of Twitter's potential for this). Her strong familial and work ties are maintained through multimodal communications applications such as Viber and Skype.

[74] UrbanSpoon and TripAdvisor are reputation apps in that they rely on the input of users to provide information on the reputation of a service (such as quality of a meal).

Meredith shares the dispersed nature of her social relationships, but the ties she creates are not necessarily two-way or interactive. The affordances of social media not only allow increased communication but also provide the ability to explore the personal archives and data trails of individuals (such as blogs and photographs) in a unilateral manner. The persistence and searchability of social media means intimacy and closeness may be maintained at a distance to the embodied context of a relationship, through external platforms like Facebook or a blog. Naomi's experiences also reflect this intimacy, as she engages with the personal photography of her family, with images stored indefinitely on Facebook, being easily shared across platforms (such as to her interface), and which can be easily searched for from the Facebook interface. While Meredith is content with a distant, mediated relationship, Naomi uses the Informatic Context more interactively. She uses the Informatic Context to create individualised connections to important relationships. All these connections are between physically dispersed groups, occurring in different contexts, reflecting scalability. For instance, when out of the office Naomi contacts her PhD students using Skype. Thus Meredith and Naomi's social relationships become networked, a set of connections and flows between groups and entities at different social positions (i.e. scales), facilitated through the affordances of the Informatic Context.

While there are complications that come with digital networks and data circulation, evaluations of living as an Informatic Person are largely positive. The contribution of the Informatic Context is indicated by Naomi in her discussion of networks, and continues to be reflected in other participants such as Meredith. They recognise the importance of information technologies, and that their complications are merely minor impediments in contemporary sociality. Network social morphologies present a number of advantages and positive effects that benefit the Informatic Person.

These networked interactions help to maintain connectedness that may have otherwise been lost due to distance and time. They are the same kinds of flows that Mark and Kenneth's accounts reveal

(see pages 198 and 200 respectively), these being the informatic communications, traces and exchanges that are circulated through networks. In Meredith's context they include blogs and photographs that can be conveniently accessed from a personal interface device. In doing so, she describes how these forms of contact have provided an improved quality to her interactions that would otherwise be absent without these networked interactions. This highlights the multimodality of informatic technologies and the new range of affordances that they provide to social interaction. Although not being able to replace being locally present to her friends, they allow a depth and "richness" of contact otherwise not possible without the technology and its enhanced interactive capacities. As she later states:

> I was at university in Sydney in the 80s, [informatic technologies have] been a way of connecting and just being aware of what [my friends'] lives are like. And occasionally, and it's very important, we are an age now where people die. So a friend of mine, he's actually from Launceston, but I knew him in Sydney, he died in New Zealand [...] I went on his Facebook site, and that's where we were all there [on the page]. Writing what we knew and kind of loved about him. — **Meredith**

Digital memorials are an increasingly common use of social media, as they allow often dispersed networks of friends and loved ones to connect and grieve[75] (Leaver, 2013; 2015). As Meredith indicates, although the context is morbid, informatic technologies provide a means of connecting with distant yet important friends (including the deceased) that otherwise would be impossible. Although a tool for grieving, informatic connectivity is positive in that it allows her to make this connection. Another more positive example is how Meredith can receive vicarious enjoyment from the wedding photos of her friend's children, albeit in a digitally mediated manner. As indicated by

[75] For a further analysis of grieving and mourning practices, including the impact of digital technologies on these experiences, see Gibson (2015).

several different researchers (Baym et al., 2004; Johnson et al., 2008; Kim et al., 2007; Valkenburg and Peter, 2007; Wang and Wellman, 2010), digital technologies can be a positive factor in users' social relationships by improving, strengthening and maintaining their quality in spite of distance and time. The informatic flows that Mark, Meredith and Kenneth highlight (as expressed through circulations and abstractions such as email, text messages, social media and blogs) are essential to enhancing social relationships, as they allow personalised, on-demand forms of connection and interaction to be made.

The above analysis reveals two important points about the everyday social life of the Informatic Person. Firstly and most obviously, is that their experiences and actions are closely reminiscent of a networked social morphology. The social engagements described by Mark, Roger, Meredith, Naomi and Kenneth, both personal and professional, are not solely co-present and physically similar, but dispersed across time and space, using broader socio-technical assemblages in order to function. This changes the scale of relationships, and represents the creation of individualised networks. Informatic Persons become a unifying point between these networks, reflecting the logic of networks and Networked Individualism. While they can be problematic (as Kenneth notes), they are also highly beneficial to relationships with significant others (as Meredith and Naomi indicate), and also as a part of daily business and professional interactions (Mark, Naomi and Kenneth). These connections are so integrated and central to successful socialisation that to be disconnected from the flows and networks of society is potentially an issue. Secondly, the networked social orientation that Informatic Persons describe is advantageous to them personally. Although Kenneth does highlight some issues with networked and mediated social interactions, the rise of networks holds great potential and positivity for many participants' everyday social interactions such as work (Naomi), family (Naomi and Meredith) and consumption (Kenneth). The personalised nature of these networks provides opportunities for contact and interactivity that are convenient and with fewer boundaries than before, with Mark and Kenneth indicating that the advantages of email and

communication on demand are beneficial to their social networks and also their social responsibilities.

## Control as Advantage — Using Informatic and Network Contexts for Personal Advantage

With the life of an Informatic Person at the centre of a complex assemblage of socio-technical interactions, and having a presence that is networked and facilitated through informatic means, participants' ethno-epistemes reflect two main ideas: control and advantage. Participants understand that living as an Informatic Person provides a means of benefiting themselves, their interest and their personal situation. This narrative of positivity, achieving and accomplishing that the informatic affords is therefore understood as constituting a form of advantage. One of the primary ways in which advantage is articulated in the ethno-epistemes of participants, both explicitly and implicitly, is through control. As demonstrated in Chapter Seven, informatic risks are often conceptualised using ideas of control (or the lack thereof) around one's personal information. In discussing the positive and advantageous aspect of their use, participants refer to ideas of control; how the informatic and the unique affordances it provides allows them to control their daily lives. Thus the advantage of the informatic is the power to have greater control and capacity as a part of participants' everyday interactions. This control differs from that raised in Chapter Seven, which emphasises the dominion of the Informatic Person over their digital traces, and instead focuses on how data and elements of the Informatic Context can be employed to manage relationships, embodied or mediated, immediate or distant.

### Controlling Contexts and their Collapse

One of the most obvious ways in which control and advantage are expressed in the lives of participants is when discussing the interplay between the different contexts the Informatic Person

occupies. This is foreshadowed by Roger (see page 200), who notes the convergence of personal and private contexts. Unlike Roger, participants here view this blurring not just a positive coincidence of the Informatic Context, but an advantaging experience of living in the Informatic Context. For example, Lynda describes how informatic technologies have influenced these contexts for her:

> [Informatic interactions have] taken over your life. You don't sort of go home and knock off and stop reading your emails. There use to be some level of excitement when you get to work the next day and go oh "I wonder how many emails and who's emailed me?" and it's just not like that anymore, it's, you know, it's just constantly available. [...] So yeah, it is a blur, a bit of a jumble, but there's a liberation in that I think. Particularly, and I, I'm conscious that I use [that] word [liberation], and I've talked a lot about the level of organisation in my life that I think is, obviously important to me, to feel really organised, otherwise it's like I'm drowning and these [informatic devices and services] definitely help to feel like that I'm on [the] personal and professional level [...] I think professionally, definitely my professional, networks and even my friends who are professionals would all agree that it's, that these technologies are sort of fundamental to the leading of their lives. — **Lynda**

Lynda describes what danah boyd (2008b) and others (boyd and Ellison, 2007; Marwick, 2011; Vitak, 2012; Vitak et al., 2012) call context collapse[76]. Examples of context collapse can vary, and may include the blurring of different social situations (such as family life versus professional life), relationships and social interactions (where friends disclose inappropriately to family members), or in how physical and digital spaces are negotiated (such as young people's use of social media at

[76] boyd (2008b; 2014) uses this term to describe the blurring, and eventual removal, of boundaries between different spheres of a person's life.

school — see boyd (2014)[77]). It is evident here in how personal and professional lives are blurred as Lynda negotiates the needs of her job (as a manager at a regional university), and as a recent mother and partner. Interestingly, these experiences are not inherently negative. Instead they are opportunities for relationship management, as they allow Lynda to better control the flows and interactions she experiences as contexts collapse. The same affordances that create context collapse also provide Lynda a sense of "liberation" in her everyday life, with presence bleed (Gregg, 2011) facilitating more opportunities for managing the demands of these two contexts, regardless of where Lynda is. Digital services and technologies provide a means of expressing control, organising relationships and interactions as the Informatic Person so chooses. This corresponds with observations made by Wajcman et al. (2010), Nijp et al. (2012) and Rose (2014) that Informatic Contexts can have a positive effect on how individuals negotiate the tensions of work and personal life. Their capacity to do so is not automatic or guaranteed (see Mazmanian et al., 2013), as they can also expose an individual to greater attempts by employers to control their lives. This goes beyond the peripheral association Roger describes, and instead is a fundamental aspect of Lynda's experience in the Informatic Context

Using instances of context collapse to manage and control life in the Informatic Context is developed by several other participants who, like Lynda, have positive associations with these scenarios. This is described by Henry who views the Informatic Context as positive because it allows him to work context collapse to his advantage, and not be overwhelmed by it:

[77] According to boyd (2010), the collapse of context is significantly different from traditional ideas of boundary erosion, like the aforementioned work/life balance discussion, because it seeks to capture the affordances of informatic technologies in this boundary erosion. boyd lists four affordances (persistence, replicability, scalability and searchability) as contributing to context collapse, with other authors (boyd and Crawford, 2012; Hogan, 2010; Livingstone, 2008) particularly emphasising the searching and sharing capacities of informatic spaces as crucial in boundary blurring scenarios.

> [The convenience of the Informatic Context is] very important. I have a very busy life. Mostly work related and obviously private life as well. [...] I'd rather something seamless. Just does what it supposed to do. I just want seamless. I've got used to things synchronising themselves, I want to turn on my phone and know that the application I used on my tablet yesterday will automatically update as soon as I connect my data. Whatever I'm doing I can keep doing on a different device. That's important to me. — **Henry**

Henry, like Lynda, has significant demands in his private and work life. He works interstate as a manager for a large construction company, and is a father to seven children. Between these two roles, and the travel between his work and home, he is very busy. Henry indicates that informatic technologies allow him to better organise and manage these two contexts, again matching Rose's (2014) suggestion on the importance of control. While Lynda talks about achieving a freedom from context collapse and better managing the overload of informatic flows she experiences, Henry argues the opposite. He suggests that he is not seeking to better separate out or discretely manage his contexts, but instead to better integrate them. This is highlighted in how he values the synchronisation of his phone and tablet, and his desire for "seamlessness" between work and personal contexts. Thus he attempts to encourage context collapse. Henry illuminates how context collapses are not uniformly experienced social occurrences but instead, as Davis and Jurgenson (2014) describe, are mediated and reshaped according to the degree of intentionality at stake. Davis and Jurgenson suggest two distinct forms of context collapse: context collusion and context collision. A context collusion is where there is a wilful intersection of networks and contexts, with an individual inviting different networks and contexts together for a specific purpose (such as allowing work contacts to join a user's private social media page to further professional relationships). A collision is when contexts are forced together with undesirable or uncontrollable results, such as when intimate photographs are discovered by professional colleagues. There is a normative element

to these situations, as the relationships of an individual, and the very identity of the individual themselves, can be influenced by these changes in context. In Henry's example, context collusions are an expression of agency, exploiting porous networks for his own social gain and maintaining involvement in both important aspects of his life without barriers or restrictions. Henry seeks to use the affordances of the Informatic Context to achieve this, such as with remote data synchronisation between interfaces. It is Henry's belief that doing so advantages his desires within both work and personal contexts, as he later states:

> [...] But I have to say it means I can be more involved in my family's life. So I'm a father, and partner, and I'm better at it because it works. — **Henry**

Context collusions are therefore an empowering element of the Informatic Context, giving an Informatic Person affordances to control and manage their relationships. The normative aspect of context collusion is clear here, as not only is Henry more functional and involved in his personal life, but he describes himself as being "better" because of this collusion. Informatic devices and services allow Henry to enact this context collusion in a way that benefits his identity and relationships, while demonstrating the positive power of control that can be achieved in the Informatic Context. As noted above however, context collapses are variably defined. The positive experience Henry describes may reflect the affluent, educated background of participants here. The lack of context collisions and negative experiences may stem from the fact that these participants are more likely to be managers or professionals (Henry is both), whose role allows them to have greater autonomy and power in their work. Workers in non-managerial, blue-collar professions may not experience the Informatic Context in the same way. As Davis and Jurgenson (2014) suggest, collapses and collusions are social practices, and spread across demographics and contextually situated. In this presentation however, the Informatic Context affords control, and benefits the Informatic Person in their everyday life.

**Controlling the Self in Context**

Living with data means acknowledging the role of data in defining the self. Context collapse raises the idea of self-presentation, but this is further advanced by Informatic Persons in relation to discussion about control. The Informatic Context can be an advantageous space for identity work, but this must be sufficiently controlled in order to be an advantage. This section explores how Informatic Persons manage their sense of self in the Informatic Context, particular in relation to ideas of control and advantage. The idea that a user must be responsible for their networked interactivity is raised in Chapter Seven and explicated around Whitson and Haggerty's (2008) concept of a care of the digital self, which describes how a user is encouraged (and therefore expected) to adopt certain behaviours in order to protect their digital identities from harm. While a care of the digital self focuses very much on security and issues of informatic risk, participants raise a broader and more general expression of caring and controlling for themselves in their everyday contexts, expanding the discussion from security to how control provides an advantage in everyday life.

The digital disclosures made by an Informatic Person can have a significant impact on their embodied and informatic lives. This is indicated by Norman's quote, as he discusses how he conceptualises the information he shares as a part of his informatic life:

> I mean it contributes a lot to [who I am] probably, you can certainly use it to put yourself out how you want to be seen rather, it gives you more control over how people perceive you because your output can be edited into sort of bits of information to the world. — **Norman**

Norman highlights the enormous flexibility of the informatic in presenting, defining and expressing himself in online and digital spaces. This maintains the positivity towards the informatic actions (as expressed throughout the chapter), aligning with how participants enact their lives through the

affordances of the informatic and informatic flows such as emails, texts and documents. It also draws out how an Informatic Person has enormous scope for self-presentation and expression. Platforms such as social media allow the Informatic Person to have a variety of spaces and options for expressing their identity and agency, creating unique informatic representations and profiles of themselves to their networks (Livingstone, 2008; Zhao et al., 2008). As a consequence, Norman suggests informatic interactions are positive because of their capacity to be controlled and to achieve a positive representation of the self online through selective disclosure. This allows a more flattering presentation of the digital self[78] to others (Hogan, 2010) as the user curates and manages their flows online. Thus control over interactions is identified as an advantage. Norman's example is solely focused on explicit disclosures, and does not consider the possibility of implicit informatic disclosures, such as those in Chapter Seven. This contrasts what Cheney-Lippold (2011) refers to as algorithmic identity[79], which emphasises the role of implicit and automated activities in digital identities. An interaction in the Informatic Context is scalable, with all data (not just those explicitly shared) potentially abstracted away into different socio-technical systems. Cheney-Lippold (2011) argues that while data can indeed define a user it is the background information that is key, with such data providing reliable determinations of self that are difficult to challenge. Norman's belief is that control is therefore intuitively correct, but practically complicated given the scaled nature of data and such systems and a focus on explicit traces.

The importance of controlling these explicit informatic flows is particularly clear in discussion around how one's informatic flows are controlled and maintained in the context of work and professional life. While the collapse of context into different areas of life is viewed positively by Lynda and Henry for example, it is also the case that it can create certain problems. Just as context collusions can be

[78] This is of course a development of Goffman's (1959) work on the Presentation of the Self.

[79] It is an algorithmic identity, because algorithms and other computations are used to construct a digital representation based on both explicit and implicit traces. Furthermore, many of the implicit disclosures come as a result of automated computations, that is, algorithms.

beneficial, they can have negative and devastating results (such as when private and inappropriate social media postings are seen by work colleagues). Managing these is an another important example of how control provides an advantage for Informatic Persons. As John indicates:

> Interesting enough, if I thought about, "Now I want to change my job," I know a lot of employers [who] now use the Facebook to find out if somebody's done something stupid, said something stupid or whatever. So there's another aspect to that, too, is how much you expose of yourself that you would like, which you think is in a private mode. That could be interpreted differently in a professional sense. So I'm cautious of that potential impact as well. — **John**

A similar point is made by Andrew:

> So I think occasionally people have to be careful. One of my friends [a] couple of weeks ago made a comment about, he is an orderly in a hospital, and he made a comment about the nurses being incompetent. Sort of thought, well, if your friends or if anybody knows one of the nurses and sees that, you are going to be dragged over coals for that, especially considering he is an orderly, he is not a nurse so how can he possibly say somebody who is way above him in terms of training and education is incompetent [in their job], not real good. — **Andrew**

For an Informatic Person, having control and discretion over the array of informatic activities in which they engage, particularly in the flows and disclosures they make as a part of their network activities, is a valuable skill and a desirable pattern of action. John and Andrew describe situations of context collision, where informatic flows come to negatively represent a user as they become visible to different audiences and networks. These examples are similar to examples of control raised in Chapter Seven around surveillance, where risks are examples of when an Informatic Person loses

control over the use and circulation of their data. They are also dissimilar, as they refer more to the tacit social and cultural practices of control (and their associated consequences) more than the organised structures of surveillance and risk that were developed in Chapter Seven.

John approaches context collusion from his position as a manager and senior engineer, noting that the hiring process often includes a search of social media to identify disclosures that may negatively define a user. This is fully enunciated by Andrew who describes a practical example of context collision where a hospital employee criticised other staff members on a private social media page without realising how information can spread across the network and scale up into different networks. Disclosures made in the personal context are circulated outside of their intended audience, disadvantaging a person in their life. Having the ability to regulate and manage how their informatic traces and flows represent them, and to what audiences they reach, is important if the advantages of the Informatic Context are to be maintained. This focus on control over one's informatic traces and their associated audiences is reflected in the continuing discussion around issues of privacy in the social media space (Hull et al., 2011; Madden, 2012a; Nissenbaum, 2009; Stutzman et al., 2013), particularly around how one can confine and control informatic traces to a specific context or network and in doing so maintain a certain presentation of the self. This has been referred to as a process of identity management (DiMicco and Millen, 2007; Hewitt and Forte, 2006; Madden et al., 2007), which emphasises the need to manage how informatic flows can create different definitions of the person to others. This also highlights the importance and advantage that is gained by controlling personal information. Just as the implicit data traces highlighted by Cheney-Lippold (2011) can have an impact on an individual's identity within informatic networks, so too can users' explicit traces provide the basis for negative judgment, both through abstractive process and in the eyes of other users. As with Norman earlier, however, the focus remains on explicit disclosures, occurring through human agency, and not automatic or implicit disclosures (such as a user's metadata).

Practices of control are not limited to the external relationships and interactions of users, but can also involve the internal states and subjectivities of the user. The above discussion on control as an advantaging aspect of the Informatic Context has been framed around external relationships, whether between a user and an external network or vice versa. At the centre of these relationships is also an embodied human user. Several participants note that there are scenarios where the idea of control needs to be applied to themselves, as an embodied user in a relationship with technology, in order to remain advantaged. An example of this is provided by Meredith:

> [My eldest daughter] is in Canberra. I'm sitting on the lounge with [my middle daughter] and her husband, and [he] has his laptop and he's doing some sort of computer program[ing] competition. [My middle daughter] is sitting next to him with her iPhone. I'm sitting. I give up, and get out my iPhone. I type out on Facebook, quality time with [my daughter and her husband] on the internet. [My middle daughter] glances over as I do, and says "oh Mum's posting on Facebook", then they get on Facebook and look at it [...] we have a very blended life in that way. Then [my eldest daughter became] engaged with us when Kevin Rudd was made Prime Minister, that night I was watching ABC 24 on the iMac iTV. [My middle daughter] was in North Hobart watching, we are on Gmail chat. [My eldest daughter] was in Canberra. We are in Gmail chat. I'm on the computer, I've got ABC 24 and Gmail Chat, and I also have Facebook, and so I was chatting on Facebook because Facebook was going off with all of that. And then I also, every now and then, was checking Twitter, then I went to Tumblr ... then I posted on Facebook I couldn't cope. Cognitively too much. — **Meredith**

With Informatic Persons at a hub of mediated and embodied forms of interactivity, there is the potential for the enormous variety of digital flows to overwhelm the user. Meredith describes two examples of how this can occur, as she engages with her immediate family in a highly mediated

manner even when they are physically present. In addition to interacting with her co-present family members, she is also accessing various circulatory and abstractive platforms including digital news services (ABC News 24) and social media (Facebook and Tumblr) to communicate and discuss current topics with her daughters. The result is a state of information overload, cognitive oversaturation in the face of informatic interactivity that ultimately disadvantages her. Information overload has been the subject of some discussion as the internet and digital networks become more integrated into everyday life (Bawden and Robinson, 2009; Edmunds and Morris, 2000; Eppler and Mengis, 2004). With the growth of these networks information becomes more available to users, and this raises the question about how both individuals and organisations can manage this influx. For an individual user, it is not only that a person must deal with the data per se, but also the emotional and cognitive impact of constant engagement and accessibility. This is noted by Gregg (2011: 14), who states that workers within industries with high degrees of digital meditation must "develop the emotional and psychological capacity to withstand positions and workloads with no definitive beginning or end" (Gregg, 2011: 14) as digital services make a user constantly available to the demands of their employers. While focused on a work context, Gregg reveals how successful workers develop behavioural, emotional and psychological tactics to manage their Informatic Contexts and associated stresses[80]. By having some capacity to manage, and therefore control, the interface between an Informatic Person's subjectivities, and the digital milieu they occupy, a user seeks to minimise any possible disadvantage that may stem from being immersed in information, and maintain the advantages that the informatic provides.

[80] Fuchs (2012a; 2014a) and others (Bruns, 2008; Kücklich, 2005; Ritzer and Jurgenson, 2010) identify the changing relationships between consumers and producers in the digital space, where users engage in implicit forms of digital labour as they use it, simultaneously being a producer or worker who creates value (through surrendering their personal information to advertising) and a consumer (as they shop and are exposed to consumer advertising).

Roger provides another example of this, and he has a simple solution through turning off his interface. As he describes:

> I always have my phone on silent. And I guess that's probably, that my thing [is] I don't like people ringing me, so I try to control the technology invading my space in that way [... ] You don't always want to be checking work emails but at the same time it also improves your work efficiencies because you can just quickly respond to an email. But it means it's very hard to turn off. — **Roger**

While Meredith highlights cognitive overload, Roger highlights a sense of invasion and disruption. The advantages of the Informatic Context have complications, and constant availability also makes it difficult to disconnect from these networks. To this effect Roger simply leaves his phone on silent in an attempt to prevent and control for disturbances. Although a relatively mundane and simple example, this statement clearly identifies some of the problems with living as an Informatic Person, and also how these are controlled. Being constantly connected, and therefore accessible to others, means that interfaces and circulatory/abstractive platforms have the potential to be distracting at best, and a means of being controlled at worst. As Licoppe (2008; 2010) notes, mobile technologies have the capacity to be disruptive to an individual's social context, with the ring of a mobile phone summoning the individual away from the immediate embodied space they occupy, to focus on the mediated. The resulting state of divided attention that this scenario creates has also been referred to as absence presence (Gergen, 2002), a negative cognitive state of being physically present but mentally elsewhere. To avoid this kind of disruption while still maintaining advantage, a user should have some control over how they are accessed and how they respond to their device. In Roger's case, this represents simply turning his device to silent.

Eliza provides an interesting example of the interface between the embodied person and their Informatic Context, and the role of concepts of control and advantage, in dealing with injury and pain:

> **Eliza** — [Informatic technology has] made my children more accessible to me, and it's made me more accessible to them. It's also hidden them from the fact that when I'm suffering from my injury, they don't need to know I'm suffering. I don't want to stress them. And they get very easily stressed. It is actually protection for them and myself. Bet you haven't come across that one before! I use it for protection in that sense.
>
> **Interviewer** — How do you mean protection?
>
> **Eliza** — Oh [I will] say, sorry I can't pick you up because I'm really really busy and if they hear me on the phone they will go, oh is that a bit of stress in your voice? "Are you in pain mum?" Oh and plus I can just say oh my phone is out of range. And because I live in Tasmania they go OK!

Informatic technologies advantage Eliza through giving her greater control over how her physical and emotional health is viewed by her family, accomplishing what Goffman (1959) would call an act of impression management. Eliza suffers from a traumatic brain injury and experiences altered forms of cognition and emotion, and also significant physical difficulties including neuropathy, disorientation and limited movement. As a consequence Eliza is often in pain which, when revealed, worries her family. This stresses Eliza as she wishes to keep her "suffering" private and "protect" her family from her pain. Eliza uses the Informatic Context to control the expression she "gives" (intentional gestures like verbal statements) and what she has "given off" (unintentional statements such as body language which situate that which is given (Goffman, 1959: 2). Eliza can explicitly

reassure her family that she is fine, but her voice can give off that she is in pain. To present a self that is coping and without pain, Eliza uses the affordances of informatic technology to present an ideal and painless self to her family, and remain in control through a mediated relationship.

Like Roger, Eliza limits how she can be contacted, using her geographical location as a way of controlling how she is reached. Her rural location has limited reception to digital and telecommunications networks, so she can use the blindspots in coverage as justification for not answering or responding to her family via her interface. The perpetual contact that informatic technologies affords means that potentially any context or time can be made into a "front stage" space (Goffman, 1959), where an individual is expected to act and perform in a certain way. Eliza can use the blindspots, however, to enforce "back stage" spaces by de-synchronising herself from perpetual contact (Rettie, 2009), where she does not need to monitor or control the impressions she gives or gives off, and where she is not visible or contactable to her audience (her family). Pain can be expressed and experienced without having to worry about others' judgments or feelings here. Eliza thus maintains a sense of dignity, while protecting her family from expressions of her pain. This presentation of self is interesting as Goffman (1963) often emphasises that acts of impression management and self-presentation are conducted in order to avoid stigma and negative impacts upon the self. Eliza's example is different in that she is not driven by a need to avoid negative judgments, her family cares about her and would help. Instead, impression management is used to avoid expressions of care that Eliza feels are burdensome or would be upsetting to her family. This example demonstrates the close entwinement that informatic technology has to everyday life, and the identities and presentations of self for modern persons. Although they cannot remedy or repair Eliza's injury, they allow a control that supports a desirable presentation of self, advantaging Eliza in everyday life.

**Controlling Time**

One aspect of control that sits at the intersection between the internal states, subjectivities and external context of the Informatic Person is that of time, as expressed through the idea of multitasking. In an environment that is saturated with digital and informatic connectivity, it is unsurprising that some participants make references towards completing multiple interactions concurrently. Time is both an internal state, an experience that is understood from the perspective of the embodied user (Wittmann, 2009), and an external state, a fundamental dimension for reality that is common amongst people (Green, 2002). Informatic technologies and services afford participants certain abilities within their temporal context, allowing them to engage in certain ways as time passes. One of these ways appears in the form of multitasking, which continues to reflect the theme of control and how it advantages the user. This is present in Naomi's statement:

> **Naomi** — So the multitasking is great. [For example during a meeting] just about everybody is on their iPhone or iPad as well as [completing] the meeting, so if something comes up, you need to communicate with somebody about [something] you can exchange information about it. So the president of [committee one] for example is also in [committee two] and we sorted out a thing about the social inclusion plan [using our informatic devices]. She was in [one part of the state] and I was in [a different part] video conference meeting and you can sort that out during the meeting. You can't do it if you are chairing mind you but being able to multitask when you're at the meeting, you can listen/participate but then you can also do the side thing.
>
> I don't always multitask but if I couldn't multitask my paper production rate would be way down, my PhD students would be waiting an awful lot longer and I will get a lot less done, I reckon it has increased my productivity by 25% to 30% easily.

**Interviewer** — The advantages to me seem that [by] multitasking you fit all these things in?

**Naomi** — Yes, fitting all in this time, being more productive.

Naomi's statement illustrates the practical benefits that can come from being able to combine the pillars of the Informatic Context, especially around work practices. In her example she describes how she is able to engage with both co-present colleagues and staff in different parts of the state thanks to her interface (and the video-conferencing suite). Two different physical contexts were blurred together using informatic technologies, such as her iPad and the video conferencing suite, and in doing so allowed her and other members of staff to complete additional work concurrent to the meeting. Naomi's examples reflect what has been referred to as multicommunication (Cameron and Webster, 2011; Stephens et al., 2012; Watson-Manheim and Bélanger, 2007), a specific kind of multitasking described as simultaneous and digitally mediated communications, often in a meeting setting (Stephens, 2012). Turner and Reinsch Jr (2010) suggest that this form of multitasking is relatively common in workplaces, with the prevalence of informatic technologies and networks (mobile devices and social media for example) directly contributing to this. What is interesting about Naomi's example, however, is her strong belief in the positive contribution of informatically afforded multitasking given her work context. As Baron (2008: 186) indicates, multitasking is both a socially and cognitively demanding practice with the potential to impair and limit the functionalities of a worker. Naomi however views these acts of multitasking as positive, especially in terms of productivity. As she goes on to state, the advantage is significant, providing a 25% to 30% increase in her productivity. In this way practices of multitasking are also acts of control, as they allow for an Informatic Person to better control how their time is spent, regardless of the embodied context, and it advantages them in the completion of social roles.

As Baron (2008) also suggests, one of the primary motivations behind multitasking is in response to perceived time demands, with multitasking used to make up for time lost or to increase the available time to work, courtesy of the affordances of the informatic. Thus the practice of multitasking becomes a means of advantaging a user in their context. Because interface technologies allow constant connectivity and a range of interactivity to be completed on demand, the interface devices provide affordances that support multitasking (productivity applications, and easy and rapid communications for example) within a user's context. The fact that Naomi positively evaluates this is striking, as to suggest that multitasking is a positive contributor to her professional life implies her relationship to this work is one of deficit (Elfering et al., 2013; Offer and Schneider, 2011). Her work is so demanding, and there is so much to do, that multitasking is positive because it helps address this time deficit. Thus multitasking could be seen as a symptom of a broader problem, of a field that is increasing labour and time pressures on its workforce. Elsewhere, multitasking and digital services has been linked to increases in work stress (Barley et al., 2011), suggesting Naomi's experiences are atypical. Regardless of this, Naomi views multitasking as a means of control. Through having this control, Naomi also suggests that a person is more advantaged than otherwise possible, presenting an alternative interpretation of multitasking practices that valorises presence bleed.

## Conclusion — Everyday Control and its Paradoxes

A central advantage to living as an Informatic Person is the affordances the Informatic Context provides for controlling everyday life. The Informatic Context offers a range of tools and abilities that Informatic Persons use in their everyday business, with this advantage resting on the ability to control their situated contexts. Communications, interactivities and time may all be better directed and managed through informatic relationships. Control is therefore not only a central dynamic, but also a central value of Informatic Persons. This resonates closely with the previous chapter on surveillance, where control is indicated to be an important value in dictating and responding to risk. While this is negotiated against other competing values to justify acquiescence, the importance of

control appears to run deeply through the EEAs of Informatic Persons. It appears to be a more general narrative and approach to life with technology than just a response to certain kinds of socio-technical circumstances. While control is central because of the advantages it provides, by emphasising the importance of control it also suggests that Informatic Contexts and everyday life are somehow uncontrollable, or at least in need of being more tightly controlled. This is not necessarily a negative observation by participants, as control is viewed as an advantage, but implicitly suggests that Informatic Contexts and the everyday may be viewed as more chaotic and uncertain than in previous times. This may be in part related to the scope of relationships in the Informatic Context, and the potential for immediate relationships to have connections into broader socio-technical contexts (as developed in Chapters Five, Six and Seven). Mediated relationships allow situated contexts to engage with distant and situated others (such as social media) which, while a source of advantage, can also be problematic (as Chapter Seven advances around surveillance). This aligns well with some recent grand narratives in sociology from Bauman (2000; 2005) and Giddens (1990; 1999b) on the fate of modernity, but is distinct and significant in how it emphasises these issues in a situated context of technology. Giddens (2002) raises how technologies contribute to the circumstances of a "runaway world", but does so in relation to broader socio-technical change. Discussion here, however, has situated the potential circumstances for control (or the lack thereof) as also being enacted at an individual level. Participants' use does not explicitly reflect the runaway world idea, and instead suggests that the very systems that Giddens (1990; 1999b) believes contribute to rapid social change are also viewed as a means to address and benefit from it.

The contribution of informatic technologies to everyday life therefore reflects a potential paradox. The Informatic Context allows more options for control over everyday practices and life. Simultaneously, it also is an integral part of a social context that is becoming increasingly less controlled and more uncertain. The lives of Informatic Persons are therefore placed at a contradictory nexus between the positive contribution of informatic technologies for gaining control,

and the potential for these technologies to contribute to a context that is uncontrollable. This has strong resonances with the previous chapter on surveillance, as participants identify how the Informatic Context features technologies that lead to risks, things that take control away from them. The significance of the idea of control in the overall trajectory of Informatic Persons is paramount, with ideas of control appearing to be central in how the Informatic Context, and Informatic Personhood, are understood as a whole. This reinforces that relationships in the Informatic Context, while situated, are tied into much larger socio-technical assemblages as a part of everyday life, and that the exchanges occurring between the situated and the macro-social may have unexpected implications.

The importance of control continues to be explored in the next chapter through the idea of normative tension, and the potential moral difficulties that come with the Informatic Context.

# Chapter 9 — Informatic Tensions — Human/Nonhuman Relationships and Social Tension

## Introduction

Relationships within the Informatic Context are "Janus Faced" phenomena (Arnold, 2003a), with the capacity to oscillate between positive and negative qualities. While previous chapters have highlighted the positive relationships that the Informatic Context affords, this chapter explores the tensions and difficulties in these relationships, and the concerns human actors raise about the nonhuman elements of the Informatic Context. As demonstrated throughout this thesis, living as an Informatic Person is to operate through mediated, socio-technical relationships. It is to form and manage hybrid relationships between technology, data and other people. The relationships are often scaleable, connecting situated actors to distant contexts (as developed in Chapters Five through to Eight), but always involve combinations of human and nonhumans. Not all participants, however, are comfortable with these hybrid relationships. Social relationships and experiences are often understood in a manner that emphasises the importance of humans and human interests over that of nonhumans (data and technology for example). When this importance is challenged, tensions arise. The background of these tensions and responses to them are the focus of this chapter.

This discussion is informed by Latour's (1993) *We Were Never Modern.* While discussed in more detail below, Latour argues that there is a fundamental ontological tension between humans and nonhumans in understanding society. This chapter draws upon this idea to understand the tensions that participants describe. The increasing entwinement of technology in society means that the Informatic Context may challenge or disrupt the importance of human users in social relationships. Interactions in the Informatic Context are often reliant upon nonhumans, their influence being intrinsic to creating and maintaining social connections. The affordances of data and data technology

mean relationships maybe highly individualised and interactive, yet more reliant on nonhumans. With society and social relationships framed as exclusively human, this practical reality challenges the exceptionalism of humans, and the privileged position of humans in the EEAs of participants. Participants raise three general examples that illustrate these tensions: personal relationships and the potential influence of informatic technology on them, human-centric social spaces and the impacts of informatic mediation, and with regards to young people as a specific category of risky users. These sites are the social backdrop to the ontological tensions that Informatic Persons describe.

The first sections establish the tensions that Informatic Persons experience. It focuses on Latour's (1993) notion of the Modern Constitution to highlight the conflict present between human and nonhuman relationships, and adopts Gieryn's (1983) idea of boundary work to understand the relationships formed as a consequence, focusing on the personal relationships of participants. These themes are developed more in the second section, where the dynamics of boundary work, particularly authority and autonomy, are developed across the experiences of participants. Human-centric social spaces, like hospitals, are raised in this discussion. A unique example of boundary work is explored in the third section, with a distinctive pattern of boundary work found around young people (children and young adults). The final section explores what Latour (1993) describes as acts of purification, specific acts of boundary work undertaken to separate the humans and nonhumans. This section explores two etho-epistemic tactics: the creation of a narrative around "living without technology", and the "devaluation" of technology. Each of these acts of purification seeks to push back against nonhuman contexts, and reassert the superiority of human beings. These acts subtly reflect the theme of control, with humans attempting to express control over nonhuman others.

## The Modern Constitution as Relationship Tension

While the Informatic Context is a source of wonderment and positivity for many (as discussed in Chapter Eight), it also has the potential to be a source of concern for participants. The relationships formed within the Informatic Context can contribute to a sense of ontological tension for some participants, centring on the changing nature of the relationship between humans and nonhumans. This argument is advanced by John, who points to the impact of informatic technologies on communities and personal relationships:

> **John** — In some ways [informatic technology and services have] enriched society because [of] the easi[ness and] convenience of people of mutual interest to connect to each other [... but people have] lost all that more general communication they may have had by walking down the street and saying, "Hello there, neighbour." Because all the neighbours are all inside watching TV or whatever, you know [...] I think there has been some deterioration in our ability to call ourselves a community or a society because of this communication where we're more selective. Because there are so many choices, we have to be selective but I think that's isolating in many ways. [...] I think it's isolating and it's probably that rural background coming out of me, that is, the city is not a particularly person-friendly place to live and the technologies make it even more isolated hence the example [of] public transport [and how we are] not talking to others and all the rest. Do you know what happens when you pack rats closer and closer together?
>
> **Interviewer** — They become very aggressive.
>
> **John** — They begin eating each other. Look at the ills in our current society about how we treat others. We're headed in that direction. We don't care about the other.

John highlights the assemblages of relationships the Informatic Context presents, and how not all of these connections are positive. Relationships formed and mediated by the Informatic Context, and therefore by technology, have come to negatively influence pre-existing relationships in his life, such as that between neighbours, and the ability to communicate with different groups of people (such as on public transport or in public space). While affording positive qualities such as immediacy, in John's view there is a potential for mediated relationships to be isolating, leading to negative social outcomes like aggression. John's statement reflects a nostalgia and romanticism for situations that do not feature intrusive data technologies, and instead rely on embodied co-present contact. As he states, he comes from a rural background and is a member of an older generation. This is reminiscent of what Hookway (2015) describes as moral decline sociology, a branch of sociology which emphasises narratives of declining moral and social standards in contemporary society. For example, Putnam (2000) and McPherson et al. (2006) suggest that telecommunication technologies have contributed to a decline in social networks and forms of social capital, with McPherson et al. (2006) specifically highlighting the role of the internet in facilitating this decline. Technology atomises an individual, empowering individuals to make relationships and social choices based on personal preference, eroding common community. While moral decline is a theme here, John's argument is also one of the concerns that nonhumans pose to human relationships. As advanced throughout this thesis, the Informatic Context necessitates consideration of relationships that feature nonhuman elements. John's concerns for the decline of community are predicated on the link contemporary relationships have to data technology. What John describes as "general communication" is a relationship that is non-mediated and human only, like speaking face to face to one's neighbour for example. Thus at the core of his argument is the suggestion that a nonhuman element has influenced human relationships or social situations in a way that diminishes the human element, which he believes is problematic.

This argument reflects what Latour (1993) describes as the “Modern Constitution”. Latour argues that modernity is based on a problematic and paradoxical “Modern Constitution” (Latour, 1993: 13) that guarantees the separation of humans (society) and nonhumans (nature, the environment, objects etc.). The first two guarantees of the Modern Constitution emphasise the independence and separation of humans from nonhumans (the third is discussed below in more detail). Society is exclusively human, separate from nonhumans (nature, animals, the environment). John’s concerns come from a violation of the Modern Constitution, and the recognition that human and nonhuman relationships are no longer as distinct. Relationships and social spaces that were once only modern and exclusively human are now hybrid. Informatic Persons must deal with these consequences, which can be negative. This is further developed in a novel example by Kenneth, who provides a story of how the everyday experience of a holiday is influenced by informatic technology in a negative way:

> I went to buy a boat a while ago at Airlie beach and outside Airlie beach are backpackers, hundreds of beautiful young women, handsome young men and they are all there touring the world, doing their thing. Now 20 years ago, they would have been all over each other like a rash. Instead every individual sitting there, (imitates keypad noise) “look at me. I’m at Airlie beach.” Click. Here’s the photo of what it’s like in my room, click, and attached to that is an email to you. They are not there. They are effectively living in a virtual world even though it’s the real world. They are not there, they are not connecting with each other. They are so busy self-blogging their great adventure to Australia that they’re not having the bloody great adventure in Australia. They are having a great blogging session in Australia. I find that to be really tragic and shallow as hell and I think this is a bigger thing, it’s not just a part of communication. [...] I’m thinking this thing [device] is supposed to be a

> tool and hey, it's not supposed to be sort of a sliced part of your life. I can see the attraction but I still think it's sort of shallow in a lot of ways. — **Kenneth**

Kenneth's example illustrates the tensions that can form when relationships and contexts that were thought of as exclusively human (like a beach holiday) become entwined with nonhumans (digital technologies). By making negative judgments upon certain kinds of mediated, hybrid relationships Kenneth engages in what Gieryn (1983) calls boundary work which he describes the symbolic and material efforts made to demarcate two ideological bodies from one another (Gieryn, 1983). With the boundaries between human and nonhuman relationships stretched in this example, Kenneth attempts to demarcate the two by adopting a vocabulary that criticises hybrid relationships. This emphasises the importance of separating out humans and nonhumans, reflecting the ideas of the Modern Constitution. The features of the Informatic Context, such as interfaces and circulatory networks that allow blogging, are no longer just a tool or a means of accomplishing something. Instead they are an active contributor to the very nature and quality of the relationship. For Kenneth, previous generations on holiday were concerned with co-present relationships (such as their partners) and the physical experiences at hand (the beach), and contemporary beachgoers seem to place more emphasis on digitally mediating this experience (via blogging) than on the physical experience. The incorporation of digital technologies into previously human-only experiences conflicts with the established social assumptions used to understand this space, assumptions that reflect the Modern Constitution and the separation of humans and nonhumans. For Kenneth, relationships are lessened as a consequence, being more "shallow" and indicative of some kind of cultural shift around relationships. This shallowness resonates with Heideggar's (1977) arguments on technology and "the approaching tide of technological revolution in the atomic age could so captivate, bewitch, dazzle, and beguile man that calculative thinking may someday come to be accepted and practiced as the only way of thinking" (Heidegger, 1966: 56). The risk of technology is that human beings might come to understand the world around them solely through the logic of

technology (Heidegger, 1977). Heidegger argues that this logic, or the essence of technology, is to reveal and understand the world as merely "standing reserves" of potential functions (Waldby, 2000: 29). To consider societies in such a way, with a focus on functions over the value of human beings is, for Heidegger, a negative outcome. For Kenneth, allowing hybrid relationships achieves a similar end, creating lesser relationships, diminishing the embodied experience of visiting the beach. The Modern Constitution is therefore an implicit theme in how Kenneth structures his EEA towards relationships in the Informatic Context. Human relationships are viewed as being superior to mediated and nonhuman ones, and the encroachment of the nonhuman upon the human is a diminishing factor.

While Kenneth and John suggest that the problem with relationships in the Informatic Context is a current issue, Victoria's concerns relate more to the future potentials of technology. She shares the concern that technology changes previously important human relationships, diminishing the person in question as a consequence. As she states:

> I don't know [where the informatic contexts leads]. I can't predict and forecast what [society is] going to be. I think, what kids are going to be doing in 10 years are things that you and I think aren't possible. I mean who would have forecast this sort of thing we are talking about today? You just can't predict. I just hope some of our older values don't get lost or replaced by technology, like nothing can beat a good cuddle. — **Victoria**

In Victoria's view the continued spread of data and data technologies in society may create a future where irreplaceable human relationships and interactions, like a cuddle, are lost as technology entwines itself further into human society. Victoria privileges human-only relationships and contexts, highlighting the importance and superiority of physical contact, affection and proximity over nonhuman, mediated relationships. The introduction of nonhumans to said relationships

diminishes their human qualities, revealing the underlying disquiet that Victoria has towards the Informatic Context, and the importance of the Modern Constitution to her. Nonhumans are thus a threat to human relationships, and a separation between them should be maintained. This evokes the importance of boundaries in understanding relationships in the Informatic Context, such as those between humans and nonhumans that the Modern Constitution implies, as their transgression is a source of tension for Informatic Persons.

## Boundaries, Authority and Autonomy

An excellent example of the tensions in human and nonhuman relationships, and the boundary work related to these, is found in how Informatic Persons negotiate mediated relationships in social situations. Concerns around the etiquette of technology use are not new, as illustrated by research on mobile technology (Baron and af Segerstad, 2010; Campbell, 2008b; Campbell, 2006; Ling, 2004). Mobile and digital technologies afford perpetual contact to users, supporting mediated relationships across different times and spaces. As a consequence, the boundaries between different social situations and relationships often become blurred. For Informatic Persons, there are many situations and relationships where this can occur, and which illustrate the complications of nonhumans in the Informatic Context. This is displayed by Roger:

> The more I think about it, my use of technology is not about other people but more about myself so it is actually sort of like a private experience. It's like reading novels, [it] is a sort of a private, individual experience, and in many ways the [interface] is like that. Like it does connect you with others doesn't it? It's also, it [is] a sort of withdraw into the self at the same time, and I have to think that this symbolic meaning of headphones. This kind of way of shutting out others aren't they? Shutting off your ears to the demand of the other, a way of enacting kind of the blasé attitude. — **Roger**

To be able to withdraw into a mediated relationship via the Informatic Context is positive to Roger. The nonhuman elements of the Informatic Context (particularly data abstraction and interface devices) provide an individualised, sensory intensive and always available experience that can remove Roger from his co-present context. Such technologies create what Habuchi (2005) describes as “tele-cocoons” of private interaction that can be used to avoid or limit social contact in public space. The idea of a disengagement to public space and immediate persons is not new, with Simmel (1976) arguing that a “blasé” attitude to people is required in urban environments to survive and function, something Roger notes later when discussing how he puts his device to silent. What is new and interesting in this statement, however, is how the boundaries between human and nonhuman are changed. In studies of boundary work charting the establishment of science in society, Gieryn (1983) highlights the importance of authority and autonomy in achieving this. Boundary work and boundaries are power relationships that establish the ability of an entity to have self-direction against external bodies (such as other competing disciplines), and to speak commandingly about the space it occupies (science and knowledge creation for example). Roger’s example reveals how these factors present in micro-social examples of boundary work around technology and humans. The Modern Constitution of Informatic Persons is challenged as Roger integrates nonhuman relationships into his personal practices, becoming more reliant on hybrid/nonhuman relationships, and less a pure human agent who is autonomous from nonhumans. Using his interface device (a smartphone) Roger is able to withdraw into a private sensory experience of his choosing, turning himself away from his immediate co-present space to focus on the sensory experience his interface provides. This positive experience is only available if Roger cedes some of his autonomy to nonhumans, and accepts this relationship with technology, reducing the boundaries between humans and nonhumans in this relationship. This transgression maybe positive for Roger but it has social consequences, as Roger is now focused internally to the mediated relationship.

What is unique about the Informatic Context is the potential of informatic functions to magnify and individualise the nature of communication, and challenge the autonomy and authority of human relationships in society. Habuchi (2005) does not explore the implications of internet and data circulation/abstraction (such as multimedia, applications and games) capacities that interfaces have as standard. Interfaces provide a unique capacity for tailored and individualised communication solutions to individuals (Campbell and Park, 2008; Rainie and Wellman, 2012). They also provide the connection to broader socio-technical assemblages of circulation and abstraction such as social media (or surveillance as Chapter Seven describes), being an example of the changing scale of relationships in the Informatic Context. Roger provides another example of this, describing the birth of his son:

> When [my partner] was in labour in hospital. I had my [smart]phone with me [...] I was playing games, but I had work emails coming in about the [workplace] review. There were all these attachments and I was starting to engage with it. I was like, and I just had to say, what the hell are you doing? Like it was stressing me out, because I was like, I felt torn between wanting to stay engaged with this stuff when I didn't really have anything to do and then I was like, God you can't be doing this. And it was stressful. That's when I just had to shut the email off. That's ridiculous. I just can't be thinking about work while I'm in the labour ward because I need to be relaxed and playing games is relaxing and whatever, but reading work emails about [workplace] reviews is not. — **Roger**

Processes of data circulation (emails) and data abstraction (playing games) are facilitated through his interface (smartphone), providing an individualised form of interactivity that Roger uses to manage the stress around the birth of his child. It brings distant nonhuman systems into his situated context, to mediate his responses to those around him. This is more than the perpetual contact of a mobile telephone. It is the withdrawal of a person from co-present and physical interactions, and into a

relationship focusing solely on interactions with nonhumans (devices and software for example). The Modern Constitution is explicitly challenged in such scenarios, as the autonomy and authority of an Informatic Person from nonhuman interactions is tested. Roger's attention is turned from the co-present space towards a nonhuman, and his power to act in his co-present relationships (the birth of his son) is shaped by his device as he tries to relax through technology. The boundaries between human and nonhuman relationships, and therefore the distribution of agency and autonomy for humans, is complicated in the Informatic Context, and a source of concern to some people.

These complications are made further visible by Lynda, who describes how managing relationships in the Informatic Context creates a moral dilemma for her:

> I think mobile devices help you to be a bit of a moral subject, so being, making choice about how to communicate and connect, and moreover how not to communicate and connect, is better facilitated through this mobile device. So instead of calling someone at 10 o'clock at night, or calling someone when they are going to be bathing their children, I can send a message to them, with an exclusion don't feel like you have to reply to this. Don't feel like that sense of immediacy needs to be given back to me. — **Lynda**

This example illustrates the tensions that nonhuman elements create in the Informatic Context, as the nonhuman is both the source of tension, and also the potential solution to this tension. Lynda describes how increased options for communication in the Informatic Context have also increased her sense of moral responsibility, describing herself as a "moral subject" in her mediated relationships. She faces a moral problem in finding an appropriate means of interaction that respects the circumstances of the recipient. The perpetual contact (Katz and Aakhus, 2002) that data technologies afford, and the spread of interfaces that facilitate this, creates these circumstances, allowing mediated communications to intrude into social situations that have been reserved for

contact with embodied humans, like the bathing of children. Simultaneously, however, interfaces (a mobile device) afford Lynda the option to communicate in a variety of ways, allowing her to select a mediated interaction that respects this situation. Lynda's new moral situation comes from the growing permeability of barriers between humans and nonhumans, which are both the source of and solution to a problem. Mediated relationships can be used to respect, or disrupt, an existing social situation, making the autonomy of humans and nonhumans less clear. It also questions the authority of the user as well, as the technology can empower the user to make moral choices, but it also can disempower them by making their private lives more accessible. In both cases, the boundaries of the Modern Constitution are pressured, placing Lynda in a position of conflict.

Tensions around the authority of human and nonhuman relationships are also visible in other spaces, with the intrusion of hybrid and mediated relationships creating further discord. This is illustrated below in a statement from Henry:

> I cannot remember the last time I went to [Catholic] mass, and there wasn't a [smart]phone ringing. I find that terribly disturbing. So intrusive, [it] is a real thing for me. I hate it. I am most apologetic if I accidentally did it to you. But more and more people are not apologetic. — **Henry**

Mandy expresses similar sentiments:

> I really hate it when people have phones that make noises in meetings, so I wouldn't even dream of taking my [smart]phone to a meeting [... for example] people in the middle of a discussion realising they've got a message and looking at the message rather than continuing to participate in the discussion. Those sorts of things. Yeah, it's just ill-mannered. But that's to my generation, it's certainly not to my kid's generation. — **Mandy**

When mediated interactions stemming from an interface device occur in a context where there are pre-existing norms favouring human, unmediated and face-to-face interactions (such as a meeting or Catholic mass) then tensions become apparent. Two highly co-present, embodied contexts are described by Henry and Mandy, spaces where the norms and rules for interactions are solely focused on human actors. Humans have the authority and autonomy in these spaces. Intrusions disrupt the significance of humans, diminishing the importance of physical and co-present relationships. They are viewed as something "terribly disturbing [and] so intrusive" for Henry, and "ill-mannered" for Mandy. Mediated relationships also affect the whole space, not just specific actors. Licoppes (2004) indicates that notifications from informatic technologies, like the ringing of an interface device, affect not only the user in question but also those immediately co-present, alerting the body of people around them to the communication. This experience is noted by Katz (2006), Ling (2004) and Banjo et al. (2008) as being almost universally regarded as socially disruptive and reflecting negatively on the character of the person who owns the device. Normative judgments in this context are therefore not based on the intention or desire for mediation, but the mere fact it occurs. They represent a form of boundary work, a sanction for those who fail to regulate their mediated relationship. This is in line with the Modern Constitution, and creates a normative stance that in future will attempt to enforce the boundaries between the two.

An interesting point raised by Mandy is that different groups have different normative expectations around technology. Mandy mentions that younger generations do not necessarily share her generation's beliefs around technology, thereby highlighting the situated nature of technology norms. While contexts change, by furthering perpetual contact informatic technologies can disrupt the human focus of a social space, creating tensions between human and nonhuman actors.

## Young People and Boundary Work

A unique variation in the discussion on boundary work and nonhumans is raised concerning young people. Of the 22 participants interviewed, 15 have children, and of these 15 participants, eight currently have at least one child who lives with them[81]. The parents of younger children describe disagreements regarding the boundaries around technology use that can be a source of tension for Informatic Persons. As Mandy describes below, members of more recent generations (millennial for example) seem to have more liberal views of technology and the potential moral issues they present, in comparison to older generations. As Julia discusses here:

> [I wonder if informatic technologies and services are] changing the way we think? [My husband] and I hired this beautiful shack on the East coast on the weekend just before school went back. And we told the kids we were going to this terrible place, and [my husband] said — don't expect too much because mum has hired it, and it's probably going to be terrible. And when we got there it was beautiful with a pool and everything. And the second they got in there, they were texting photos up, updating their Facebook. And it started to make me really mad, for fuck sake why can't you just enjoy being here? Rather than needing to [share it], and then I thought, no it's actually, and I thought about saying OK we're going to turn off the wireless. And then I thought no, that's the world they live in. — **Julia**

Boundaries are understood differently between generations, with younger generations accepting greater degrees of hybridity in their relationships than their parents. Tensions on a family holiday illustrate this, with Julia and her husband believing a holiday should focus only on co-present and human interactions, while her children are unconcerned at mixing co-present and mediated relationships. Julia's children possess their own personal interfaces and are involved in a variety of

[81] The age and demographics of children were not explored in this study. Judgments on this were made through participant statements in interviews.

circulatory and abstractive processes (social media, audiovisual capture and sharing) as a part of the holiday experience (boyd, 2014; Livingstone and Brake, 2010). Social, locative and digital media are pervasive in the lives of (so-called) digital natives (Palfrey and Gasser, 2013), with numerous studies illustrating the centrality and contingency of these always-on, mediated forms of interactivity in the social practices of young people (see (Bertel and Ling, 2014; Buckingham, 2008; Goggin and Crawford, 2010; O'Keeffe and Clarke-Pearson, 2011)). As discussed above with Roger, these interactions are not exclusively about contacting others or presence availability, but instead about always-on engagements and interactivities in the data space, such as circulating or manipulating data across different social contexts (like social media). These young Informatic Persons are comfortable with hybridity in a way that their parent's generation is not. As Ito (2008: 36) points out, however, while "[y]oung people are turning to online networks to participate in a wide range of public activities [they are also] developing social norms their elders may not recognize". These norms do not necessarily reflect the Modern Constitution that their parents have internalised, creating a tension between them. This is seen in Julia's rejection of her children's technology use. She becomes frustrated because of her children's apparent inability to enjoy their non-mediated family time without adding mediated and interactive elements into this context. They seem to have less autonomy from these technologies than older generations, something that makes them mentally absent from their getaway (Gergen, 2002), and a source of contestation for Julia.

For Julia the failure to hold firmer boundaries between humans and nonhumans makes her hold negative views about young people's relationships to humans and nonhumans. As Bolton et al. (2013) argue, Generation Y and other (so-called) digitally native generations are sometimes perceived as possessing negative personal qualities due to their love of technology. This sentiment further compounds the view that young people lack the cognitive or emotional maturity, abilities or experiences to deal with digital technologies in an appropriate manner (Flanagin and Metzger, 2008: 6). Thus young people's digital behaviours can be understood as risky and wrong in the eyes of older

generations (Byrne and Lee, 2011). To favour or embrace mediated relationships with nonhumans at a young age is viewed as some kind of deficit in a young person, with older generations linking positive personal qualities to maintaining the boundaries between human and nonhuman relationships. Mark also develops this negative perspective on young people's acceptance of technology and hybridity relationships, emphasising the problems that come with their openness to the Informatic Context:

> I think when people, maybe younger [people], a bit more naïve, they give away too much information. And that's a thing, probably a bit concerned about, because I think people do give away more information about themselves than what they necessarily need to, but, they've got to make that decision on their own. [...] We've fought really hard all our lives for our privacy, and to maintain our privacy, and suddenly, everyone's giving it all away on social media and stuff like that. And so, I think for young people that's their culture. They don't know how much we've fought to maintain our privacy. And then we just give it all away. — **Mark**

Young people's openness to hybridity is represented as naivety and carelessness by Mark, linking their acceptance of mediated relationships as a privacy issue. By welcoming mediated relationships, young people have less control over their data, and in doing so they are also riskier. This resonates with discussion in Chapter Seven on risk and surveillance. As discussed, informatic risks are hybrid and have numerous potential causes, and they are managed through a sense of control. In this example the issue is less about the risks and acts of data control, but more the judgments placed on those people who fail to meet a certain standard of control, in relation to a specific age group or generation. Privacy represents a normative issue (Bennett et al., 2014; Lyon, 2002), with the acceptable level of privacy being rooted in cultural and social assumptions about what degree of disclosure is acceptable (Solove, 2006). Social expectations and judgments around privacy varies across contexts, with noticeable differences present depending on the technology used

(Nissenbaum, 2009; Regan, 1995) and the country in question (Zureik et al., 2010). From Mark's position as an older man (over the age of 50), an openness to hybridity is evidence of the lack of judgment that some young people have towards the Informatic Context, causing friction for Mark. As he states, young people are unaware of how hard his generation fought for privacy amongst their relationships, ostensibly through maintaining the boundaries between different relationships. The question of privacy also suggests the existence of entities that seek out personal information and the broader surveillance dynamic, linking negative judgment to the potential scalability of a mediated relationship. These elements illustrate the dimensions of power that are related to the Modern Constitution and its position in the EEAs of participants, and the negative judgments that come when boundaries are neglected.

While negativity is a common response to young people's acceptance of hybrid relationships, as Julia highlights above, the effectiveness of negativity is limited. Whether their parents accept it or not, young people's social practices do reflect a blurring of the boundaries between human and nonhumans contexts. It is the new normal for social engagement, as Julia demonstrates above when she does not turn off the wireless connectivity of her children. Although older generations disagree with these changes, and push against it, even they come to accept some examples of hybridity, even if they do not necessarily support it. This is discussed by Henry in relation to his family:

> I'm of a different generation, I'm 50 in a not very long time. In a year in a bit. If I was 20 now I'd have a different opinion, I'm sure. I see young people texting each other, or Facebooking each other, or numerous other social platforms across the table. But I find it odd that people can be sitting round a table, and I've seen my kids do it, and they will be in a conversation or whatever in the ether. So there will be three, four, five could be seven [of us] sitting round the table, and two or three of them are involved with the same conversation somewhere else. But why aren't

> you in this conversation here? But to them it's perfectly normal. Mind you if it's at the dinner, the phones go off. — **Henry**

With up to seven children in his family (depending on parenting arrangements and availability), Henry is keenly aware of the role of mediated relationships in his family. He has observed his children and other young people engaging in circulatory and abstractive data processes (activities focused on nonhumans) in co-present environments where non-mediated interactions are usually supreme, such as sitting at the kitchen table having dinner. While he demands that the norms in this personal space be maintained to favour embodied and co-present contact, he accepts that in any co-present environment young people will seek out hybrid relationships and engage with nonhumans, noting several of his own children do this. It is "perfectly normal" for this new generation, although he still has some limits to accepting this. Such a shift in action reveals what Silverstone et al. (1992), and more recently Dourish and Satchell (2011) describe as a moral economy of technology, where emotional and moral exchanges are a part of how technologies are used and adopted. Silverstone et al. (1992) originally highlight this concept in relation to home media technologies (television and radio) in the context of the home, and note the complex negotiations between different family members that are involved in adopting and using a device. Henry's example illustrates the strong values that come to emphasise the importance of being human. While he is open to some negotiation, he still enforces limits on use, rejecting any active technology during dinner, because of the continuing belief in the authority of the human, and human's autonomy from nonhumans in these spaces. There is however more opportunity present for his children to use technology in the family space, demonstrating the changing nature of relationships here and potential limitations in the boundaries Henry sets. Although more accepting and open to some negotiation, Henry still favours an EEA that places human, co-present and non-mediated contexts as superior to mediated, non-human contexts.

## Purification through "Living without Technology" and "Devaluation"

While younger generations may be more accepting of hybridity, a number of Informatic Persons actively respond to the blurring of boundaries the Informatic Context brings. This final section explores the tactics deployed by Informatic Persons to limit, prevent and repair the boundaries between humans and nonhumans. Participants' actions are what Latour calls acts of purification, a specific form of boundary work that aims to separate humans and nonhumans, reducing hybridity (Latour, 1993: 10-1). As raised earlier, the Modern Constitution has three guarantees, with the third stating the need for acts of "purification" to keep these separate (Latour, 1993: 32)[82]. Examples of purification are acts that seek to demarcate items, fields or contexts into categories that are distinctive from one another, and mutually exclusive. It is a complimentary kind of boundary work, as it maintains and enforces the distinctions between different entities, such as humans and nonhumans (Latour, 1993). To a certain extent, acts of purification are already undertaken by participants, and these occur in their general attempt to create relationships and social spaces that are human only, and limit the influence of nonhumans. This section however focuses on two specific ethno-epistemes that participants deploy to address the tensions and conflicts that the entwinement of nonhumans entails. The first is the creation of the "living without" narrative, where participants emphasise their ability to live separately and independently from Informatic Contexts. By reasserting the importance and independence of human interactions, the boundaries between humans are emphasised over nonhuman ones. The second tactic is that of devaluation, where the contributions and qualities of hybrid relationships in the Informatic Context are critiqued and downplayed in comparison to human-only ones. These discursive actions reassert the boundaries between humans and nonhumans, and address the tensions some Informatic Persons have about living in Informatic Contexts.

### "Living Without Technology" as Purification

[82] This presents a paradox, as for purification to be required implies that nonhumans and humans are not as exclusive as the Modern Constitution guarantees.

One of the most obvious ways in which participants strengthen boundaries is to build an ethno-episteme around the Informatic Context that focuses on their separation and independence from it. By distancing themselves from technology, nonhumans are positioned as non-essential to the individual person, which maintains human autonomy and authority. Embodied human beings are thus privileged as active, independent agents whose relationships and interactions are of greater importance compared to those which involve nonhumans. The Informatic Context is undoubtedly valuable for users, as participants do not wish to abandon technology use, but they also wish to reflect on the distinctiveness and importance of humans in society. This is discussed by Lynda:

> I think I can live without having the technology at hand, but I'm saying it in a very generalised sense. If we all decide that we were all no longer going to use these technological devices, we'd revert back to a world without them. And I think I'd be OK with that. [...I] actually have a bit of a clearer head away from those devices, albeit [without] the availability of information from those devices. — **Lynda**

This is also raised by Marie:

> Oh I could live without [informatic technology]. If it got taken away from me tomorrow, and I never ever had it, I'd find it [tough], I'd have to make serious readjustment, because it has become a very integral part of my life. And how I run my life. But, you know. I'd go back to a rotary pick up phone if I had to. That's what I grew up with (laughs). I can live without the DVD player, I can live without a whole host of things — **Marie**

These quotes contextualise popular sentiment that it is practically difficult[83] to live without an interface device (Gao et al., 2013; Lee et al., 2014) or internet access (TATACommunications, 2015) in contemporary society. They illustrate the duality between informatic technologies and human social lives, with technology noted as valuable and positive, but also as replaceable and non-essential. For example, Marie especially notes the numerous contributions that such devices have to everyday life, emphasising the lack of practical boundaries between human and nonhuman contexts. Despite a degree of acceptance of these hybrid relationships, however, it is also not unthinkable to separate one's life from technology, even if it may be problematic. Both Lynda and Marie note complications and conflictions associated with living without technology, as relationships with technology are habitual and integrated in the Informatic Context (Beer, 2009; Vishwanath, 2015). For example, while speculating on her position Lynda states that living without technology is accepted "if we all decide" to do so. Such a decision is therefore predicated on a social change to limit or restrict technology use. As Lynda notes, this could even be a positive, as she feel she has a clearer head without an interface device. Marie also expresses some concerns about what giving up technology may mean, stating a need for a "serious readjustment" should it occur. The capacity of humans to control the integration and direction of technology is therefore emphasised, which reflects elements of authority and autonomy raised earlier. While difficult, humans remain as the enduring and significant part of this relationship, with the power to dictate current and future boundaries with nonhumans.

An alternative way that the uniqueness of human contexts can be developed is in emphasising the replaceable nature of nonhuman contributors. In the above quotes, Marie already begins to establish this line of thinking, suggesting that informatic technologies are replaceable by other older items (such as the rotary phone). This suggests that while technologies can be replaced or upgraded, this does not mean older devices have no purpose or role, but that the needs and perceptions of

[83] A more colloquial presentation of this idea that is popular amongst young people is that it is "impossible" to live without connectivity or mobile phone access.

human users have changed. This resonates with research done under the Social Construction of Technology (SCOT) paradigm by Pinch and Bijker (1984) and Bijker (1997), who argue that the social context and human users of technology determine their meaning and implementation. Technologies are therefore fleeting, while human interactions, determinations and qualities are enduring and of far greater importance. Nonhumans are thus not autonomously meaningful, and are defined by human, reaffirming boundaries between the two. Examples of this are provided by Bruce, who uses the example of newspapers:

> **Interviewer** — Some people say that they can't live without their mobile device, it's so much a part of them. Is this statement true for you at all?
>
> **Bruce** — No it's not true at all. It would just mean a change. A change I would have to get used to. It might take me a couple of days, but I would soon do it. And if I felt the need I would buy the [news]paper. Yeah, no it wouldn't worry me.

Mandy advances a similar argument, using discussion around dictionaries:

> **Mandy** — I guess it's one of the reasons that I do use them is because it's so convenient. But, was it ever really inconvenient to open a dictionary? Not to me it wasn't anyway. It's just that it offers this alternative and it's the alternative that is [available] wherever you are at the time, it's just within reach. So it's a quick. Could I live without it? Yes of course I could. Yes.
>
> **Interviewer** — That was one of the questions I've got here. Could you live without your mobile technologies? I know people of my generation have often [...] said that they cannot live without their mobile technologies.

> **Mandy** — I lived for many years without them, so yes I could. That is generational, that is a generational thing. So we know we can live without them and I sometimes wish that people would do without them.

Just as Lynda and Marie argue, Mandy and Bruce both assert it would be possible to live without informatic technologies, even if doing so would be undesirable. Mandy and Bruce point to examples of common digitally mediated activities, such as reading a newspaper and using a dictionary, as examples of the benefits of the Informatic Context and why it would be difficult to reduce their use.

Convenience and speed of data access are common reasons why digital services have replaced non-digital services like the newspaper Bruce mentions, and Mandy's dictionary (Connaway et al., 2011; Jarvenpaa and Lang, 2005; Lee and Cook, 2015). In both instances, however, informatic technologies do not have the monopoly on convenience or functionality, with Mandy and Bruce noting that it is entirely possible to replace informatic technologies should the need arise. Participants' ages are a factor in this, as Mandy states, she believes her ability to separate herself from technology is closely related to her generational position (Generation X). Younger generations (such Generation Y) would therefore have more difficulties in limiting their use, given their openness to hybridity (see Julia's discussion on page 240 onward for more on this). Technologies are identified as helpful but replaceable modifiers in the lives of participants. They afford beneficial relationships, but can be disposed of or replaced with alternatives at the whim of the human user, who is ultimately the most important element in the relationship. The agency and autonomy of the human user is thus asserted, and the contribution of technology to relationships downplayed.

**Devaluation as Purification**

The second approach to responding to tensions around technology is to reinforce the superiority of human contexts through critiquing and devaluing the contributions of technologies and nonhumans. By being critical, and in some instances attacking Informatic Contexts, a user re-asserts the barriers

between human and nonhumans. Autonomy and authority is returned to human contexts through these discursive acts that re-emphasise significance of humans in relationships. This tactic is adopted by Jack:

> **Interviewer** — Some people have said that they literally cannot live without their smartphone or mobile device, or whatever.
>
> **Jack** — Some people say that about their dog. Some people say that about their car. People get attached to anything, don't they? That's a function of that person's emotional needs. It's not a function of the technology. Some people get attached to their favourite pen or tie or whatever it might be. That's a personal thing, isn't it? People are like that. People like to become attached to things. Hope that doesn't mean they're more attached to things than other people.

Here, tensions around technology are reframed as a consequence of humans, and not as a consequence of the technology itself. For example, attachment to a nonhuman is "a function of that person's emotional needs", with the object serving the need of the individual user, and not the product of a hybrid relationship. Jack therefore seeks to critique any suggestion that technology and nonhumans can hold any greater value than human relationships or interactions. Human emotions are conceptualised as separate and autonomous from any hybrid relationships. While being critical of technology, he does not totally dismiss the role of nonhumans. He points to other examples of attachment formed between nonhumans and people, such as animals and favourite ties or pens. This is an interesting return to Latour (1993) and the Modern Constitution, as Jack refers to other kinds of nonhumans apart from technology. In this way there is a recognition of the potential contribution of these nonhumans in society more broadly, in that Jack acknowledges there are social relationships with nonhumans. For Jack however, this does not constitute an acceptance of hybridity or networks, as it is possible to have connections to nonhumans so long as the human is regarded as

superior and that the relationship originated from the person. Humans are therefore elevated beyond nonhumans, continuing to assert their authority.

The idea that human relationships are superior to mediated/nonhuman ones is raised by Rich, who frames issues of emotional attachment in a similar manner to this:

> [Informatic technologies and services are] just more of transportation, it's more of just conveying things, it doesn't actually have the emotional [quality] to itself. In regards to the emotions of being contacted by that individual, as opposed to the mobile phone, if you think about it I'm not going to start wanting to kiss my phone. But if somebody is contacting [me] through the other end of the phone, I might sort of, I might have an emotional attachment to that person, but not the phone itself. [...] it's just basically as I said before it's a conduit to make that happen. [...] I see it just as a means to an end. — **Rich**

Mediated relationships and interactions with nonhumans serve as carrier services for the needs and emotions of human users. It is the messages and interactions of the human in the relationship that are important. It is not unusual for human beings to express emotions towards nonhuman actors. This includes pets, animals and the natural world (Franklin, 1999; Macnaghten and Urry, 1995; Michael, 2000a; Pile, 2010; Wrye, 2009) as well as material objects such as cars (Sheller, 2004). Unlike these instances, however, Rich views the nonhumans in question not as any specific or independent object, but as a subservient medium or conduit to human interests. This conceptualisation speaks both to the autonomy of the human and also to the authority of humans in social relationships. While informatic technologies are increasingly entwined in the creation, enactment and maintenance of intimate and personal relationships (boyd, 2007; Ellison et al., 2014a; Ling and Campbell, 2011; Papacharissi, 2010), such entwinement cannot be reasonably related back to any quality of the technology in Rich's view. Instead, like Jack, they are examples of

human beings' emotional needs and functions, with technology merely a "means to an end" to achieving and continuing human needs.

Another example of the devaluation of nonhumans comes from Kenneth, who is critical of those who choose to link human characteristics, such as identity, to nonhuman factors. By rejecting and devaluing relationships that define humans through nonhuman items, Kenneth serves to maintain the authority of humans over nonhumans in everyday life. As he describes:

> **Interviewer** — Do you think that the device, in particular, says anything about you to other people?
>
> **Kenneth** — It certainly does if you're into them. If you've got the latest model of [device] yes, it does. But, it tends to be – I think within the cliques of people that are technofiends and know that that is a [certain device...] That's great, if you're a group of people that know it's a touch screen or whatever. Otherwise, I don't think it matters, no – I don't think it matters. I know there are groups of people to whom it matters very much. That used to be true with clothes; it probably still is. [...] Honestly, if people are that bloody shallow, they're going to judge who and what you are by your possessions down to that level of minutia. Usually, they're not worth worrying about in my humble opinion.

Kenneth acknowledges that informatic technologies and contexts are contributing to an individual's identity, but rejects its influence on him. He also devalues those people who connect their identity to nonhuman things. To do so would place increased value on nonhuman elements over the human, something of which certain "cliques" of people (what he refers to as "technofiends") are guilty. Unlike Jack, who acknowledges some potential for nonhumans, Kenneth is much more critical, and rejects any suggestion of nonhuman relationships being valuable. Indeed, he is very disparaging

towards those who take this position, with his language suggesting a further negative evaluation of these users. This is true of any nonhuman relationships, as Kenneth refers to other objects, such as clothes, as being a source of similarly "shallow" behaviours and evaluations. In this way Kenneth reflects Heideggar's (1977) concern that technology can change how people are viewed. Although he does not suggest that people can only be viewed in terms of functions, he does indicate a change in the way some groups of people evaluate each other according to technology, a relationship of which he is critical. To do so reduces the distinctiveness (that is, autonomy) of the human in these relationships. Being critical of these types of logic is a way of returning authority to the human, pushing back against the idea of nonhumans having any value in comparison to humans, and re-establishing the autonomy and authority of human beings over nonhumans.

## Conclusion — Boundary Work and Normative Tension as Control

The tensions between humans and nonhumans in the Informatic Context illustrate the shifting nature of social values and relationships around technology, and the desire by many participants to control these. Just as in Chapter Seven on risk, the idea of control resonates strongly with discussion on normative tension. Acts of boundary work undertaken by participants reflect efforts to control the symbolic integration of the Informatic Context into human, embodied environments. They are symbolic in that they relate more to meanings and beliefs around the use of space, rather than material outcomes. Participants still carry and use informatic technologies and, as the previous chapter demonstrates, are happy to leverage the Informatic Context where possible. The advantaging capacity of the Informatic Context (as discussed in Chapter Eight) must be regulated, however, and align itself with pre-existing human values. Failure to do so results in tensions and efforts to limit or control any violations, as illustrated through acts of purification work. Not only do Informatic Persons have to control external risks such as surveillance, but they must also manage and control the very nature of their circumstances. The affordances and contributions of informatic technologies are therefore just as ambivalent as they are advantageous. As demonstrated in Chapter

Five on adoption, this is recognised from the outset by some participants, particularly those having critical adoption EEAs. Continued involvement and use of informatic technologies does not therefore necessarily solve or remedy any of the problems that the Informatic Context creates. Instead new kinds of issues and conflict can emerge.

While there is a sense of control present for many participants here, there is also the suggestion that the desire to control and regulate the Informatic Context may be becoming more relaxed. Control is a strong theme in the language of authority and autonomy that Gieryn (1983) adopts in describing boundary work, and it is visible in the practices of Informatic Persons here. In several instances, however, participants begin to acknowledge scenarios where nonhuman and human contexts will become more entwined, and accept the blurring of these boundaries. In many ways this has already occurred. The scalable nature of relationships in the Informatic Context (as raised in Chapters Five through to Eight) is a reflection of this entwinement and blurring of human/nonhuman boundaries, as the distant others linked to participants strongly feature nonhumans (for example surveillance and social media feature many algorithms and devices beyond the human user). Amongst participants here, the decision to use older nonhuman devices (such as Bruce and Mandy suggest), or the discussion of young people and technology, is a tacit acknowledgement of a shift in values, even though participants believe their current position is superior. This suggests a softening and relaxation of some aspects of control, and of the authority and autonomy of the human versus the nonhuman. While participants still regard human contexts and values as superior, they seem to accept its growing entwinement in some circumstances as acceptable, and that hybrid relationships are unavoidable.

In doing this however, it does present somewhat of a paradox, as while the consequences of nonhumans and hybrid/mediated relationships are highlighted as undesirable, participants' responses to the overall paradigm shift towards these relationships are relatively relaxed. The next generation of participants potentially signals a change in the significance of the Modern Constitution

towards hybrid norms, something a majority of participants presently reject. If mediated interactions are as undesirable as participants indicate, a greater focus on limiting these might be expected. Instead, participants seem to favour current circumstances, but are more relaxed about a potential future with technology. It is perhaps the case that participants acknowledge the inexorable spread of technology. Informatic technologies are already closely entwined in the life of the Informatic Person, which may have led to a grudging acceptance of the continued spread of nonhumans, despite the tensions they create. If so, then the transition towards hybrid circumstances does not appear so disastrous, as predictions of doom (such as that developed by John earlier) are not common. The association of young people with this more relaxed normative direction may indicate that participants also realise the limits of control within the Informatic Context. While these social challenges are important, they cannot control for all elements, and accept certain limitations and changes as inevitable.

These and other changes illustrate sociologically significant shifts in relationships for Informatic Persons, and in the concluding chapter the potential of these and other changes are discussed and further reflected upon.

# Chapter 10 — Discussion and Conclusion

## Introduction

This thesis is about the relationships people form with data and data technology. It has explored what kinds of relationships are created in the Informatic Context, and what the implications of these are for Informatic Persons. Participants reveal that relationships within the Informatic Context are defined by their scalability, and managed through narratives of control. The social scope of mediated relationships may easily be altered, with the actors, contexts and connections of a relationship expanding and contracting in the Informatic Context. Relationships in the Informatic Context are therefore not linear interactions between humans, nonhumans or combinations thereof. Instead every relationship is a potential assemblage of social connections, growing and shrinking depending on the actors (human or nonhuman) and the activities implicated. They are defined by their scalability. Informatic Persons frame their management of scaled relationships in terms of control, which defines both the positive and negative implications of scaled relationships. Risks are negotiated against the potential for Informatic Persons to control the Informatic Context, and positive contributions defined by how they facilitate control over elements of the Informatic Context. This narrative is both a source of advantage and a potential risk for the Informatic Person. This final chapter explores the findings of scalability and control in more detail, addresses limitations regarding the research, and suggests future research agendas.

These findings are made possible through the novel conceptual and methodological framework adopted here. Using EEAs and the concepts of the Informatic Context (interfaces, circulation and abstraction) has allowed the heterogeneous nature of participants' socio-technical relationships to be more fully explored. The heterogeneity of socio-technical relationships exists on multiple levels. For example, the complex technical nature of data technologies means that there are a variety of separate, yet entirely relevant, theoretical and conceptual perspectives present. Discussion around

social media for instance is incomplete without references to mobile devices and mobile media practices (Goggin and Crawford, 2010), which are implicated in acts of consumer surveillance (Pridmore, 2012) just as easily as they are in individual practices of intimacy (Livingstone, 2008). Alone, these perspectives represent only parts of a relationship that is complex and wide ranging. Data is a commonality that runs through digital topics such as mobile media and surveillance and, by focusing on data and its related dynamics, the concepts of the Informatic Context provide a flexible frame for identifying salient issues around socio-technical relationships. By using this perspective, this thesis is better equipped to explore socio-technical issues and relationships, such as scalability and the control narrative, that are defined by their plurality across contexts.

The use of EEAs further benefits this plurality, providing a methodological approach that captures human and nonhuman relationships, while maintaining a focus on the beliefs and experiences linked to these. Unlike approaches such as SCOT (Pinch and Bijker, 1984) or domestication of technology (Silverstone and Haddon, 1996), relationships to technology and data are understood here as reflecting chains of interactions between human and nonhuman actors (Akrich and Latour, 1992). This is highly beneficial, as relationships like control are enacted through interactions with nonhuman such as algorithms, viruses and digital services. Ethno-epistemic assemblages provide a framework that accepts hybrid relationships, allowing broader varieties of socio-technical relationship to be explored. Although investigating nonhumans has been popularised by Actor Network Theory (Latour, 2005), the EEA approach used here is unique as it also considers the ethno-epistemic, and the experiences and truth claims linked to a relationship. The non-hierarchal nature of EEAs means that the experiences of different social groups (such as those of an institution compared to individual participants) are equally as valid and can be compared against each other. This has allowed findings around scalability to be developed, as this relationship occurs across social contexts. Ethno-epistemic assemblages therefore provide a favourable approach to exploring socio-technical relationships, allowing innovative findings (such as scalability and control) through its

openness to heterogeneous and non-hierarchal relationships, and its consideration of situated experiences and beliefs.

## Scalable Relationships

Every relationship within the Informatic Context is an assemblage, defined by increased scalability. Through the mediations of the Informatic Context, the situated behaviours and relationships of participants are connected to social contexts beyond their original (and sometimes intended) scope. These relationships are reliant on the role of the nonhumans (such as digital traces and data) that connect actors at different levels of society. This thesis reveals the prevalence of these relationships in everyday life, and signals the transition of scalability from specific technological platforms towards a more general quality in everyday, mediated society.

Forming relationships within the Informatic Context means accepting relationships that are mediated by data. This changes the nature and scale of these relationships. For example in Chapter Eight, numerous personal and familial relationships are described as a part of living in the Informatic Context, with these mediated relationships being advantageous to the Informatic Person through the use of interface devices and digital services that exploit circulation (such as social media). This relationship, however, is not restricted to being between two human actors. Instead, there is enormous potential for the relationship to be scaled up and connected to different contexts and levels of society. As Chapter Seven reveals with regard to surveillance, participants are aware and conscious of the potential for their digital traces to connect them into a relationship with surveillance entities. The same interactions that create advantageous relationships and abilities in everyday life can connect an Informatic Person into relationships with large socio-technical trends like surveillance, and expose them to risks that exploit data circulation. Data is already identified as a mediator (Latour, 1991; 2005), and something that can alter the message or relationship through the act of connection. In the Informatic Context, not only is the message altered, but the potential

connections and linkages forged by the message have changed. Mediated relationships no longer exclusively connect to their intended parties (human or nonhuman) but, through data, link them to different social locations and contexts.

Scalability is socio-technical, as while it relates to a technical relationship, it can also presents itself in social situations around technology, on the peripheral of the technology in question. For example in Chapter Five the process of adoption may still be subject to changes in context, even though the adoption behaviour itself is not necessarily mediated. Adoption is often obligated via external relationships that occur at different social levels. For example, close relationships such as an Informatic Person's social circle or immediate family and friends can influence adoption, just as their employers and organisational context can, and large macro-social trends (such as through acquiring a device to access a global service like a social media). The personal decision to adopt a specific interface device thus transcends the rational decision-making process of an individual, to reflect a broader assemblage of connections. Relationships can also just as easily be scaled down as they can be scaled up. For instance, in Chapter Six, the use of search engines (such as Google) as a part of learning is an example of how an enormously powerful data-abstraction practice can be scaled down for use in everyday life. This illustrates how changes in scale can occur without being visible or intelligible to the Informatic Person in question[84].

While previous research has identified the importance of scalability, this thesis makes a unique contribution in revealing the growth in scalability. It is no longer an effect limited to specific platforms such as social media, but represents a general quality of relationships in the presence of data technology. This research affirms the presence of scalability in defining mediated relationships,

[84] As boyd (2010: 47) notes, data are easily replicable, meaning that copies of digital traces and interactions may be cloned from the original interaction, and scaled up in parallel. This becomes of greater importance in discussion on surveillance and risk, as the circulation and abstraction of data beyond the control of Informatic Persons is a key factor in understanding informatic risks.

as advanced in boyd's writings on social media (boyd, 2006; 2007; boyd and Ellison, 2007) and Networked Publics (boyd, 2008b; 2014) and Miller et al.'s (2016) recent work on "scalable sociality". Considering relationships through the lens of the Informatic Context demonstrates how scalability has expanded beyond these perspectives. For example, in Chapter Eight, the role of Paypal in online shopping reveals how daily functioning can be subject to scaling that occurs beyond the scope of digital media. Compared to the face-to-face equivalent (shopping in person), digital shopping changes the scope of this relationship, up-scaling it, creating connections to systems of data abstraction and circulation such as consumer surveillance and product recommendations (Gandy Jr, 1993; Pridmore, 2012). The potential for changes in scale comes as a direct result of data processes and platforms, of which social media is but one example.

This is not to suggest that previous research has ignored the role of data, but instead has attached scalability to particular data platforms and services, rather than developing scalability itself as a phenomenon. This inherently limits the potential investigations into mediated, scalable relationships, something that is overcome by the approach of this thesis. For example, Miller et al.'s (2016) concept of scalable sociality is framed using Madianou and Miller's (2011; 2013) idea of polymedia, which argues that different digital and media technologies are used in combination, based on the situation of the user. Polymedia emphasises how devices and platforms are not discrete, but exist as part of an ecosystem of situated communications tools that users negotiate to satisfy the demands of their context. This approach is correct in situating mediated relationships as being determined by the social, emotional and cultural needs of users, in conjunction with the affordances of technology. Miller et al.'s (2016) work highlights the importance of context in scalable relationships, however they conceptualise this in relation to digital media platforms and devices of polymedia (such as social media) and not in terms of what social media actually represents: processes of abstraction and circulation. If polymedia, digital media, or social media platforms are

reduced to their most basic constitute elements[85], they are revealed to all be made of data and digital information, and therefore subject to data processes like abstraction and circulation. For example, boyd's (2010) identification of the affordances of social media (persistence, replicability, scalability, searchability[86]), is based off how the data on the social media platform is abstracted and circulated, something that underwrites the content elements a user experiences. A focus on content (such as a meme image or viral video on a social media page) without qualifying this content as an assemblage of data and data processes, misses potentially important elements within this interaction. Data itself is therefore the content, and should be the focus of scalable relationships.

Through focusing on data and its various socio-technical intersections (as defined by the three pillars of the Informatic Context), this thesis provides an original lens for examining scalability, thereby overcoming the limitations of previous research. The focus on human and nonhuman relationships in the Informatic Context, and the use of EEAs in the methodology, is particularly helpful here, as data cannot be scaled without the involvement of nonhuman systems. Whether through interface devices (such as smartphones) that allow content to be digitised, or digital platforms (for example Twitter and WhatsApp) that mediate the relationship between different human actors, nonhumans are critical. A focus on specific platforms (such as social media) limits analysis on nonhuman entities such as algorithms and code that contribute to the digital environments that create scalable relationships (Carah, 2015; Cheney-Lippold, 2011). Media systems are often intimately related to nonhumans, where algorithms aggregate and analyse content (Eslami et al., 2015), and in some case are also responsible for generating media (Carlson, 2015) and the content that users experience (Bucher, 2012; 2013). To ignore the contribution of nonhumans to these relationships is to fundamentally limit an understanding of scalability and its potential impacts on society, an issue that is avoided through use of the Informatic Context framework.

[85] Obviously the material peripherals of these platforms, such as smartphones and media devices, can be reduced to their material components, but these are useless without a common digital language to unify their interactions, hence the emphasise on the digital aspects of platforms. Many thanks to Reviewer Two for indicating the need to further elaborate on this.

[86] This is first raised in Chapter Two, Part Two, and can be referred back to for more information.

Findings on scalability in the Informatic Context raise important questions about the way in which power is distributed and applied in the digital society. The capacity for data to easily change contextual boundaries means that any mediated relationship has the potential to place the Informatic Person in a relationship with powerful, data-concerned entities. In some cases this may prove to be a beneficial and empowering relationship. The application of algorithms and data-intensive programs can be helpful and productive to everyday life. For example, ride-sharing application Uber applies a pricing algorithm that can drastically undercut traditional taxi services[87] (Cusumano, 2015). By recognising and engaging with the potential scalability of their relationships, users may be granted new avenues for social innovation and experimentation that can benefit themselves or the community around them. Further evidence of this can be seen in the monetisation of social media content (Kim, 2012), where personal photographs and videos are scaled up from their immediate contexts to be shared on social media and other platforms to generate advertising revenue for users[88]. This, however, would require significant knowledge and awareness of the data involved in the mediated relationships in which they are engaged, something that is not assured given the lack of interest participants have for further learning (see Chapter Six).

The unfortunate but more likely scenario for scalable relationships is an increasing vulnerability of Informatic Persons to systems that have an interest in data. Increasing scalability in everyday life means an increased exposure to surveillance practices, which already occupy a significant place in society (Lyon, 2007b). This is magnified as more relationships become mediated and scalable. It is not that there will be more surveillance. Scalability could, however, increase the depth of personal

[87] Through an interface device (a smartphone) a user can enter into a commercial relationship with the driver of a Uber-registered vehicle to transport them to a location. The relationship is scaled up through data generated in the transaction (such as the location data, initial request and subsequent feedback on the driver) and circulated amongst the other users of the application. Uber uses an algorithm to then vary the price of rides according to demand, allowing it to undercut many conventional taxi services. Through the data created in this routine commercial relationship, numerous changes of scale are observed, as data are scaled up into the Uber platform and abstracted, and also scaled down to be applied to other individual contexts.

[88] This is not ignore the complications that come with such action, including issues of consumer rights and consumption raised by Fuchs (2012b), and also the emotional and personal impact of sharing behaviours as pointed out by Smith (2016).

data, and be exploited to support data-intensive processes of government or management without the awareness of Informatic Persons[89]. Scalable relationships integrate data and surveillance into more everyday practices, fuelling the algorithms and data-abstraction services that manage large bodies of data and associated humans (boyd and Crawford, 2012). As raised in Chapter Six, a lower degree of interest in these processes, and a focus on immediate consequences and contexts, increases the likelihood that users will not challenge such developments. Discussion on the adoption of technology also does not suggest that security or risk management is, at this stage, an active part of determining the device or platform a user consumes. Finally, as will be advanced below, the strong belief participants have in their ability to control their data may give them a false sense of security regarding scalability.

## Narratives of Control

Scalable relationships are closely associated with ideas of control that explicitly and implicitly structure how Informatic Persons mange their relationships. The findings of this thesis reveal that that the adoption and integration of informatic technologies does not reflect a sense of disempowerment or loss of agency, as some have suggested (Deleuze, 1992). Instead, the Informatic Context represents an opportunity for users to create their own "modulations" of control across their lives. Informatic Persons' feelings of empowerment and positivity reveal an unexpected variation in how power and control are presented in contemporary society. This is significant as data technologies are often associated with circumstances of disempowerment and social control, highlighting the disparity in users' everyday experiences according to some theoretical perspectives. The strong sense of control found here has ramifications, however, as whether an Informatic Person's belief in control can be practically applied is unclear. This may lead to a false sense of security, and heighten vulnerability to risk, for Informatic Persons.

[89] For more on this see Burdon and Harpur (2014), Pasquale (2015) and Crawford (2016).

Control is an explicit feature of how Informatic Persons negotiate the Informatic Context and issues around data. This is most clearly illustrated in Chapter Seven on surveillance, where risks are defined by a loss of control, and responses determined against the value of control. While acquiescence is common, this does not indicate apathy, but highlights calculated choices around the value of controlling personal information compared to interests (such as material wealth). Enormous faith is placed in Informatic Persons' ability to control relationships (mediated or otherwise) with human and nonhuman entities, and to manage the trajectories of their digital traces. Chapter Eight sees the practical implementation of this, as Informatic Persons describe the advantages that the Informatic Context brings to their social practices in terms of control. To control something is to also place limitations and boundaries around it. These two themes resonate strongly in Chapter Six (learning) and Nine (nonhuman tensions) in different ways. The learning behaviours of participants emphasises the importance of speed and immediacy in structuring learning, which results in learning behaviours being tightly controlled. Learning is limited and technologies are blackboxed as a consequence. Devices and technologies are learnt to the extent that the user has sufficient control over the device to accomplish desired functionalities. Extensive learning is rejected in favour of speed. While speed is the value that structures this experience, the behaviour adopted here reflects the control of technology and data by the human user, a theme further developed in Chapter Nine. Acts of purification are means of controlling the Informatic Context, reinforcing social boundaries by limiting the role of nonhumans. While participants' ability to express control is emphasised, rarely is the potential for being controlled raised. Agency is emphasised in all accounts of control. Chapter Six identifies how the obligation to adopt technology is not viewed as an example of how Informatic Persons' behaviours might be curtailed, but in relation to the agency of users. Critical concerns around adoption reflect tensions in the balance of control, linking back to the assertion that risks with technology come from a lack of control.

Control is something that Informatic Persons believe is granted to them in the Informatic Context, to be flexibly applied across their relationships. This represents an original take on how power is distributed through data and technology. Whereas Deleuze (1992) argued that data systems allowed flexible, ever-changing modulations of power that broke individuals into pieces of data to be managed by different social institutions, Informatic Persons suggest that they too have a modulating capacity. Control is not a zero-sum game, with power held solely by institutions, but a relationship enacted through data that allows greater control over the social situations at stake. Power and control through data are more reflexive than Deleuze (1992) suggests, with the balance of power between individuals and institutions not firmly set, despite the enormity of these entities.

The strong belief in control here may related to the sample. Participants generally have above-average incomes and are largely tertiary educated. While a range of ages is sampled, a majority of participants are over the age of 35 and in established professional careers. Their EEAs are situated in contexts that reflect a relatively high degree of economic privilege, a factor that may afford an increased belief in their self-efficacy and agency. Other research has noted a positive correlation in economic attainment and self-belief (Boardman and Robert, 2000), and that affluence is linked to a more secure view when dealing with risk around technology (Livingstone et al., 2012)[90]. Conversely, groups with lower socio-economic status have been linked to socio-technical situations (particularly around surveillance) that are invasive and punitive, and contribute to feelings of disenfranchisement from traditional political, legal and social avenues of expression (Gilliom, 2001). Interestingly, several participants in Chapter Seven assert their economic attainment is significant, and use this as a justification for acquiescing to surveillance risks. While people rarely view themselves as privileged, even when their circumstances reflect this (Sheppard and Biddle, 2015), the fact some participants feel able to make these statements perhaps reflects that they are economically secure. This sample

[81]Livingstone et al.'s (2012) research is framed around children and the internet, with children from affluent nations viewed as more capable of dealing with online risks, although they are also potentially exposed to more of them.

is unlikely to have been placed in a relationship with the Informatic Context where their socio-economic circumstances are directly challenged and their privilege is diminished through a scaled relationship[91].

While Informatic Persons have great faith in their own modulations of control, it would be incorrect to say that the Informatic Persons here have the same degree of power that Deleuze (1992) describes, or that is possessed by institutional authorities. There are limitations and caveats to the power that Informatic Persons describe that illustrates potential vulnerabilities and unintended consequences. For example, control here focuses on information consciously submitted into circulation via mediated relationships, which does not account for the complexity of these relationships and the role of invisible but powerful factors such as algorithms. Nonhuman entities are also central to the conditions of control present, with automated judgments via algorithms (Pasquale, 2015), restriction and social sorting based on data (Lyon, 2002) and inbuilt discrimination (Burdon and Harpur, 2014) all potentially achievable through nonhuman systems. The focus on human agency and individual conduct does not adequately capture how control may be limited, restricted or enforced back upon an Informatic Person. This is complicated by the reluctance of Informatic Persons to consider the close association of nonhumans in everyday life, as Chapter Nine details, and the limitations on learning present in Chapter Six. A focus on immediacy and easiness, and the unwillingness to consider the power of nonhumans, means the Informatic Person may be exaggerating their own abilities to control their circumstances and their data traces, basing their worldview on a limited frame of reference. The Informatic Context is rapidly evolving, with new

[91] Such is the case for less privileged groups who are caught by necessity in a mediated relationship with organisations such as Centrelink, and required to digitally report their income and employment prospects (The Department of Human Services, 2016). Students, young people and the unemployed are compelled to use a system adopted by Centrelink that has been known to automatically reject applications without human oversight, preventing social security payments from being received (Towell, 2016). For these Informatic Persons, their economic attainment does not protect them against negative outcomes in the Informatic Context, and does not engender any ability to control their outcomes.

services, platforms and entities entering the field on a regular basis. Without sufficient literacy to pursue and interpret information in the digital context, and a rejection of the contribution of nonhumans, an Informatic Person maybe unwittingly exposed to scaled relationships that they cannot control, practically eroding the control they believe they possess. This further compounds concerns around surveillance, as discussed in Chapter Seven, where complex yet opaque systems are deployed throughout everyday practices.

These findings illustrate the different interpretations and enactments of power that occur around technology. Informatic Persons' experiences challenge established Deleuzian perspectives of power and simultaneously demonstrate the daily practices of power in the Informatic Context. These beliefs and practices, however, potentially signal a growing vulnerability to and ignorance of the complexities of the Informatic Context, and that Informatic Persons are vulnerable to external powers.

## Limitations and Further Research Directions

There are limitations to this study, particularly concerning the sample. A consequence of the detailed qualitative investigation presented here is that, while not the focus or intention of this research, insights presented here cannot be generalised to the broader population. While sampling bias is less problematic in studies where the focus is on depth and quality of experience (Norris, 1997), an element of bias may have been introduced into this research through the focus on affluence, and the geographical limitations of the sample. All participants were from Northern Tasmania, and a large proportion of these were aged over 35, had a tertiary education, and were in professional occupations. These characteristics are unsurprising given their correlation with affluence and material wealth (NATSEM and AMP, 2012), however, they suggest a degree of homogeneity in the sample. To a certain extent these potential biases are understandable given Tasmania's demographics makeup, which features an older population (Denny, 2015), increased

rates of poverty and unemployment (Australian Council of Social Services, 2014) and increased degrees of rurality. These negatively correlate with technological literacy and adoption (Norris, 2001; Warschauer, 2004) and make the presence of older, well-educated users understandable given the context of recruitment.

Further limitations stemming from this are the implications of affluence on findings of control and scalability. As noted in Chapter Seven and in this chapter, the persistent belief in control maybe tied to the comfort and security that affluence brings. Thus further research on more diverse populations should be pursued to explicate the validity of this concept. The findings of Miller et al. (2016) indicate scalability in a diverse range of social scenarios (including rural China and urban Brazil), suggesting scalability as more globally persistent. The potential of affluence to modulate scalability, and provide certain kinds of scaled relationship and behaviours over others may however be worth further pursuing. Affluence affords new interfaces and informatic platforms to engage in, that less privileged users may not be able to access. Analysing for any differences or commonalities would help explicate this.

The use of EEAs, and the concepts of the Informatic Context, has afforded the analytical space to explicate the significance of data and data systems in mediated relationships, and indicates a need to further investigate recent data platforms. At the time of the interviews major digital services that now dominate discussion on data and relationships were not currently active. This includes popular services like WhatsApp, Snapchat, Whispr, Uber and Tinder/Grinder. These services represent important kinds of mediated, scaled relationships that have come to occupy an important part of the Informatic Context, and in the everyday lives of Australians. For example, Snapchat had no presence during data collection. As of 2016 it has at least three million unique users in Australia (Tucker, 2016). These popular services are a source of scaled relationships that are prominent in the Informatic Context, and deserve specific attention. Recent developments in hardware, such as gaming consoles, represent a similar avenue for further research, as at least 88% of Australian

households have a gaming console of some description (Brand et al., 2015). These and other data-intensive devices have become popular in Australia, contributing to the intersections of data into everyday practices. Incorporating empirical data on how these platforms contribute to the Informatic Context and scaled relationships will further benefit the robustness of the concepts suggested here.

The position of data in the lives of Informatic Persons also suggests methodological opportunities, particularly around digital and mixed method approaches that actively investigate digital traces. Digital ethnographies have previously been used to capture a variety of digital mediated relationships (Gatson and Zweerink, 2004; Murthy, 2008; Underberg and Zorn, 2013), particularly around digital media and the situated experiences of digital media for users (Gomez and Pinkard, 2014; Hjorth and Pink, 2014; Pink and Hjorth, 2012). The successful use of EEAs here has indicated the appropriateness and value of exploring situated experiences around technology. Further developing these elements is a logical extension of the ethno-epistemic elements of this research project, and embraces the kinds of media forms that Miller et al. (2016) highlight as central to establishing scalable relationships. These approaches retain the characteristics of qualitative research, while further developing the significance of data practices. The concepts of the Informatic Context have been valuable in revealing the movement and dynamics of digital traces, making further research using approaches that track and visualise these data an interesting alternative approach. Quantitative approaches such as data visualisation would allow the scope of scalable relationships (such as those enacted via social media) to be explored in greater detail (Salah et al., 2013; Tinati et al., 2014) and specific instances of circulation and abstraction to identified. The usefulness of the Informatic Context may therefore extend beyond solely conceptualising socio-technical trends to methodological targeting and quantifying them.

## Conclusion

Data and data technologies are reformatting social relationships, and changing the nature of relationships in contemporary society. Mediated relationships are no longer secondary or isolated aspects of everyday social life. Instead, the Informatic Context reveals how they are entwined throughout, and in doing so they are altering the nature of how social practices and relationships are managed and experienced. Increased scalability reveals this, no longer being isolated to social media or single platforms, but being a general quality of life around data technologies. The very nature of this change means that ordinary people are more connected into broader socio-technical circumstances than ever before. The use of EEAs reveals this, with nonhuman systems having an important place in how Informatic Persons understand their socio-technical relationships. They must also deal with the consequences of these, as they are both empowered and threatened by these connections. Narratives of control capture these new social tensions, as individuals are both advantaged by the affordances of the Informatic Context, and made more vulnerable to the machinations of these systems. Large-scale socio-technical change and innovation are not distant or invisible to the daily, mundane context but are central to it. Ideas of scalability and control highlight this, and advance how these changes are experienced in everyday life.

The significance of these insights is to situate practices of data in the context of a society that is increasingly defined by data. There has been considerable hyperbole around digital societies (Lupton, 2015a), network societies (Castells, 2011b), the age of Big Data (boyd and Crawford, 2012) and other perspectives that highlight the emergent digital structures of the post-industrial age. This thesis has unearthed what these changes mean to everyday relationships and interactivities. The results shed light on informatic practices in the digital society, and the networks of human and nonhuman relationships that occur to enact contemporary socialities. They foreground the importance of situated practices around data in understanding socio-technical change, and signal the new social flashpoints of the digital age. Relationships to mass surveillance, social media and

mobile technologies all have viable links to everyday life through data and scalable relationships, and have close associations with the control narrative. The innovation and adoption of data systems is unlikely to slow, meaning that these relationships and concerns will only continue to grow. New technologies, from virtual reality to wearable (or implantable) technologies, will further build data into everyday life. Insights such as scalability and control highlight the importance of studying these changes, and the situated practices that users form around them.

The relationships formed as an Informatic Person in the Informatic Context are not replacing face-to-face socialities, but present relationships that are fundamentally different to previous generations and societies. At no other time in history can the everyday practices of contacting friends and family, shopping or maintaining work relationships potentially connect a person into assemblages of larger social concerns. These hybrid relationships, as Haraway (1985) describes, are now our ontology. They are both the promise and peril of the digital age. This makes concepts like the Informatic Context, the Informatic Person and approaches like EEA so important, as there must be a vocabulary available to grapple with socio-technical change. These socio-technical changes may mean new kinds of innovation and sociality, but could also increase risks of surveillance and inequality. The trajectory of these scaled relationships and control narratives are uncertain, but their impact is clear, and their importance will be continuing.

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# Appendix 1 - Participants Demographic Information

| Pseudonym | Age | Gender | Family Status | Do you have Children? | Do You Children Live at Home? | Highest Level of Education | Occupation |
|---|---|---|---|---|---|---|---|
| Kenneth Tony | 55-59 | Male | Married | Yes | No | Postgraduate/Higher Research Degree | Meteorologist |
| Mandy White | 50 - 54 | Female | Married | Yes | No | Graduate Certificate/Graduate Diploma | Academic |
| Andrew Moles | 18-24 | Male | Single | No | N/A | Year 12 Certificate | Student |
| Marie Sims | 45-49 | Female | Married | Yes | Yes | Graduate Certificate/Graduate Diploma | Registered Nurse and Nursing lecturer/tutor |
| Roger Hewitt | 30-34 | Male | Married | Yes | Yes | Postgraduate/Higher Research Degree | Academic |
| Eliza Tony | 55-59 | Female | Married | Yes | No | Graduate Certificate/Graduate Diploma | High School Teacher |
| Mark Hunt | 50-54 | Male | Married | Yes | Yes | Graduate Certificate/Graduate Diploma | College Teacher |
| Jack Lynch | 55-59 | Male | Married | No | N/A | Postgraduate/Higher Research Degree | General Practitioner |
| Naomi Reid | 55-59 | Female | In a Relationship | Yes | No | Postgraduate/Higher Research Degree | Academic |
| Melissa | 30 - | Female | In a | No | N/A | Graduate Certificate/Graduate | Research |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hughes | 34 | | relationship | | | Diploma | Assistant |
| John Snow | 55 - 59 | Male | Married | Yes | No | Postgraduate/Higher Research Degree | Engineer |
| Norman Mallison | 25-29 | Male | In a relationship | No | N/A | Postgraduate/Higher Research Degree | Technical Manager |
| Victoria Best | 50-54 | Female | Married | Yes | Yes | Bachelors Degree | Teacher |
| Lynda Shaw | 35-39 | Female | Married | Yes | Yes | Postgraduate/Higher Research Degree | Academic |
| Rich Powell | 18-24 | Male | In a relationship | No | N/A | Certificate III/V | Personal Trainer |
| Bruce Hawker | 60 - 64 | Male | Married | Yes | No | Postgraduate/Higher Research Degree | Teacher and Academic |
| Julia Thorn | 40 - 44 | Female | Married | Yes | Yes | Graduate Certificate/Graduate Diploma | Policy Officer |
| Henry Kosh | 45-49 | Male | In a relationship | Yes | Yes | Certificate III/V | Manager (Construction) |
| Gavin Harrison | 65-69 | Male | Married | Yes | No | Bachelors Degree | Retired Engineer |
| Belinda Neilson | 35-39 | Female | In a relationship | No | N/A | Postgraduate/Higher Research Degree | Scientist |
| Albert Sendai | 35-39 | Male | Married | No | N/A | Postgraduate/Higher Research Degree | Academic |
| Meredith King | 50 - 54 | Female | In a relationship | Yes | Yes | Postgraduate/Higher Research Degree | Academic |